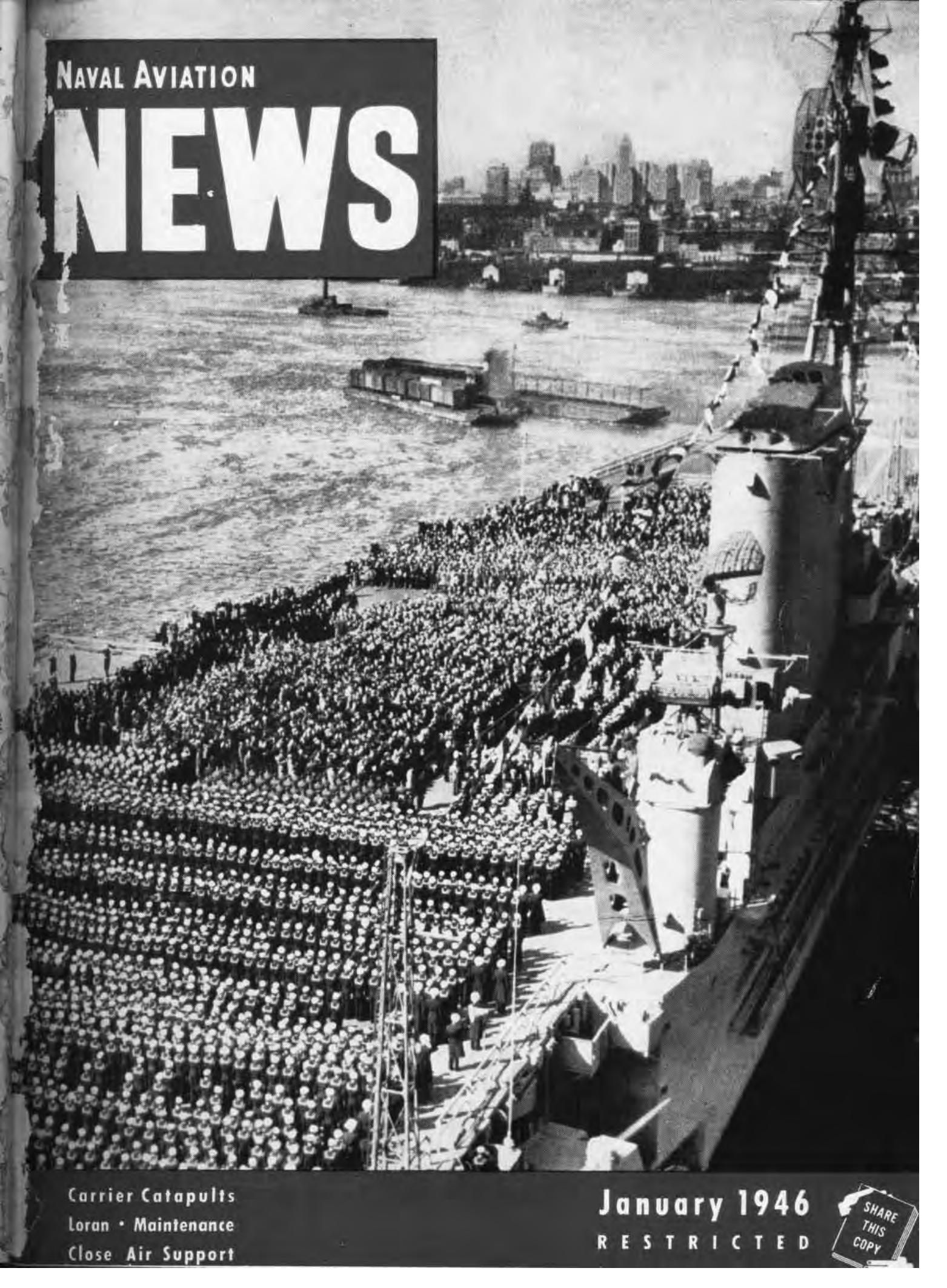

NAVAL AVIATION NEWS

Carrier Catapults
Loran • Maintenance
Close Air Support

January 1946

RESTRICTED

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CATAPULT


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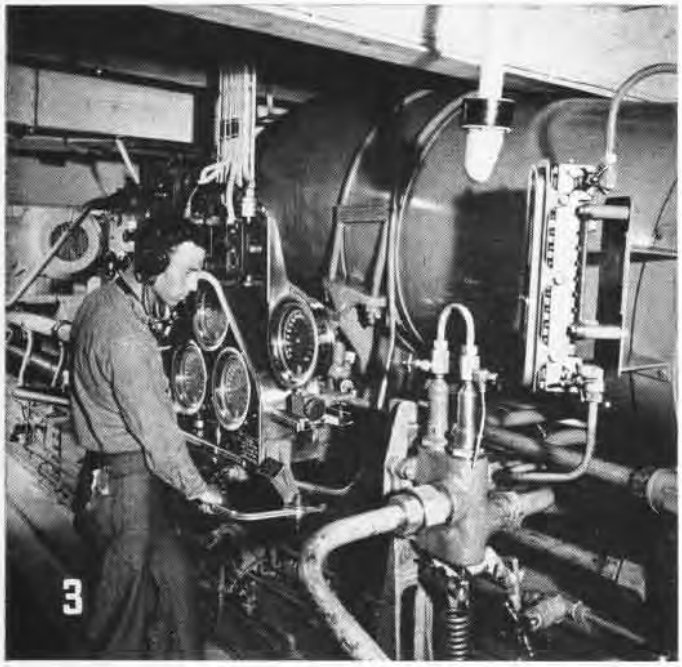
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4

CATAPULTS and arresting gear played a leading part in aircraft carrier warfare developed by the U. S. Navy but until now little could be told about those confidential supplementary "weapons" on a flattop.

Home of catapults and arresting gear—the place where they were designed and developed—is Naval Aircraft Factory at Philadelphia Navy Yard. The factory was and is responsible for distributing all such material going to the Fleet. It also has the only training school for crews and officers to operate the gear.

Every aircraft carrier and battleship and most cruisers carry some of NAF's "alumni" and products. When the war started the Navy had seven aircraft carriers and one auxiliary in commission. At the surrender, the Fleet numbered 20 CV's, 8 CVL's, and 71 CVE's. It was Naval Aircraft Factory's job to provide the catapults and arresting gear for all of those vessels and to train men to use and maintain them.

Without arresting gear it would be impossible to operate aircraft carriers. Planes could not land on their limited decks without being stopped short by cables. Catapults enable carriers, especially smaller ones, to increase the number of planes they can launch in short order. They can operate almost independently of surface wind or ship speed.

At the start of the war jeep carriers were used mostly to transport planes to war zones. As the catapult's usefulness became apparent, CVE's began to be used as convoy escorts and then to fight in all types of actions. They furnished close air support to ground troops from Anzio to Iwo and Okinawa. They catapulted bomb-laden planes cross-wind off Samar in the Second Battle of the Philippines Sea and sank two heavy cruisers and crippled a battleship. Catapults enabled them to turn the trick.

Little used before the war and during its early months, catapults soon found wide application. By the closing months, some CV's launched 40 percent of their planes this way, CVL's 70 percent and CVE's 100 percent. Admiral Mitscher ordered Task Force 58 on the eve of the first Tokyo raid to "make maximum use of catapults."

Besides being an offensive weapon, the catapult was valuable in getting planes off carriers transporting big loads of reinforcement aircraft to such spots as Guadalcanal and North Africa. Army planes like the P-51, P-61 and B-25 were catapulted because their long take-off runs made it impossible to use deck run flyoffs, or because docking facilities were unavailable.

DECKLOADS of *Thunderbolts* catapulted at Saipan helped strengthen newly-captured landing fields. *Airacobras* arrived at the Gilberts the same way since there were no docks. Task forces could stay at sea longer because reinforcement planes could be brought up by jeep carriers, catapulted and landed on the fast CV's to replace their combat losses.

Because planes can be launched with less space by catapulting, it is possible to load the flight deck to the limit with planes carrying heavier loads of bombs and rockets. Two catapults working alternately with skillful crews can put a plane in the air every 25 seconds. Arresting gear can take planes aboard every 21 seconds with top-notch crews. Thousand-plane raids were made possible by this speed-up in launching and paid off when the fighting at sea was the toughest.

ARRESTING GEAR WIRES TAKE GREASE

1. LEXINGTON'S CATAPULT OFFICER GIVES PILOT TWO FINGERS TO PREPARE FOR LAUNCHING
2. PERFECTION OF CATAPULT MADE POSSIBLE LAUNCHING FROM CROWDED GAMBIER BAY DECK
3. CREWMAN READY TO FIRE H4 CATAPULT ON INDEPENDENCE; HEAVY PLANES TAKE BIG GEAR
4. DECK CONTROL MAN PUSHES BUTTON AND MAKIN ISLAND 'SLINGSHOT' TOSSES OFF A TBM

Carriers Launch Planes Downwind with Catapults, Boosting Fighting Strength

THE GREATER striking power and maneuvering advantage which catapults gave carriers was exploited to advantage by the Navy during the war. The American small carrier force off Samar was saved by the fact it could launch bombers against the pursuing Jap battleships without turning into the wind and heading toward them. Anti-submarine patrol carriers could catapult without having to head into the wind and expose themselves to enemy fire or to disrupt the convoy.

Night operations on carriers virtually would be impossible without catapults. Because it is hard to control direction of a flight deck run in the dark, pilots have difficulty in staying on the deck until airborne. Catapulting enables them to become airborne without the ship having to be lighted up, exposing it to enemy eyes. Deck lights also blind the pilot and make instrument flying difficult when he gets in the air.

One of the most unusual stories of the war revolved around an FM-2 on the *Fanshaw Bay*. The pilot delayed his launching while the CVE was under Jap attack, until a strafing *Betty* passed over the bow. He was catapulted into the air on its tail and shot it down less than 200 yards from the ship, probably the quickest kill on record.

Arrested landings every 21 seconds is a good record, but one carrier in the famous night battle of the Philippines Sea went that one better by bringing in an F6F and TBF simultaneously—and unintentionally. They caught the No. 2 and No. 6 wires after the pilots misunderstood the landing signal officer's wigwagging and came in together.

THE NAVY uses two main types or improved models of shipboard catapults on carriers—the H2 Mod 1, and the H4. The first generally is used on smaller carriers and the big H4 on larger craft. CVB's have a newer version, the H4, Mod. 1.

Ships equipped with H2, Mod 1 catapults are capable of tossing 11,000-pound planes into the air with a 70 mph. speed at the end of their 73-foot runway. Planes loaded to 18,000 pounds regularly are launched from it.

A speed of 90 mph. is possible when 18,000-pound planes are launched off the 96-foot runway of the H4. At one time during the war it was believed that big patrol planes might have to be catapulted. NAF developed an experimental model which would lift PBM's or slightly larger seaplanes out of the water on an "escalator" type of ramp and catapult them. Development of JATO proved a simpler solution of the problem of getting big planes off in a short space.

The Navy also has several other types of catapults employing springs, electricity, air or powder. The latter two types are used on battleships or cruisers. The A4 Mod 1 (air type) on cruisers will push a 6500-lb. plane up to 65 mph at the end of its 49 foot turntable runway, using 1200 pounds pressure of compressed air for motive power. The P6 Mod 1 on battleships uses a 28-pound powder charge in a 5" cartridge to toss a 7000-pound plane into the air at 70 mph. Later mods were brought out with 6" cartridges to launch *Seahawks*.

Spring catapults are used for launching drones for target practice and electrically powered ones for extra-heavy aircraft from land-based installations. Because of the increased importance of pilotless aircraft in future wars, it is possible that catapults will be brought into increasing use to launch various television, radio and radar-controlled winged weapons like the *Gargon*, buzz bomb and *Gargoyle* developed in the past war (see NANEWS this issue, pg. 19, *Pilotless Aircraft*).

THERE are two types of arresting gear in use today whose fundamental differences are in capacity only. Designed to arrest a 16,000 lb. airplane landing at 65 mph relative to the deck, the Mk. 4, was the only type in use at the outbreak of war. Advent of heavier and faster airplanes, developed as the war progressed, necessitated greater arresting capacity.

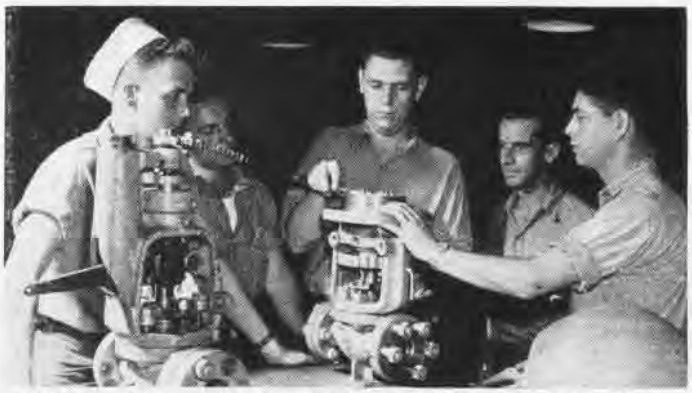
The Mk 5, Mod 0 has a capacity of 30,000 lbs. at 90 mph. and should be capable of stopping any carrier-type airplane for some years to come. Both the Mk 4 and Mk 5 arresting engines were designed and developed by Naval Aircraft Factory personnel, as well as special control valves, wire rope sheaves, wire rope and fittings.

The Mk 4 gear is in use on CVE's, CVL 22 class, some CV's that were in service before manufacture of the Mk 5, and on the old ladies of the fleet—*Saratoga, Enterprise* and *Ranger*. Later CV's, CVB's and larger CVL's have the Mk 5 engines.

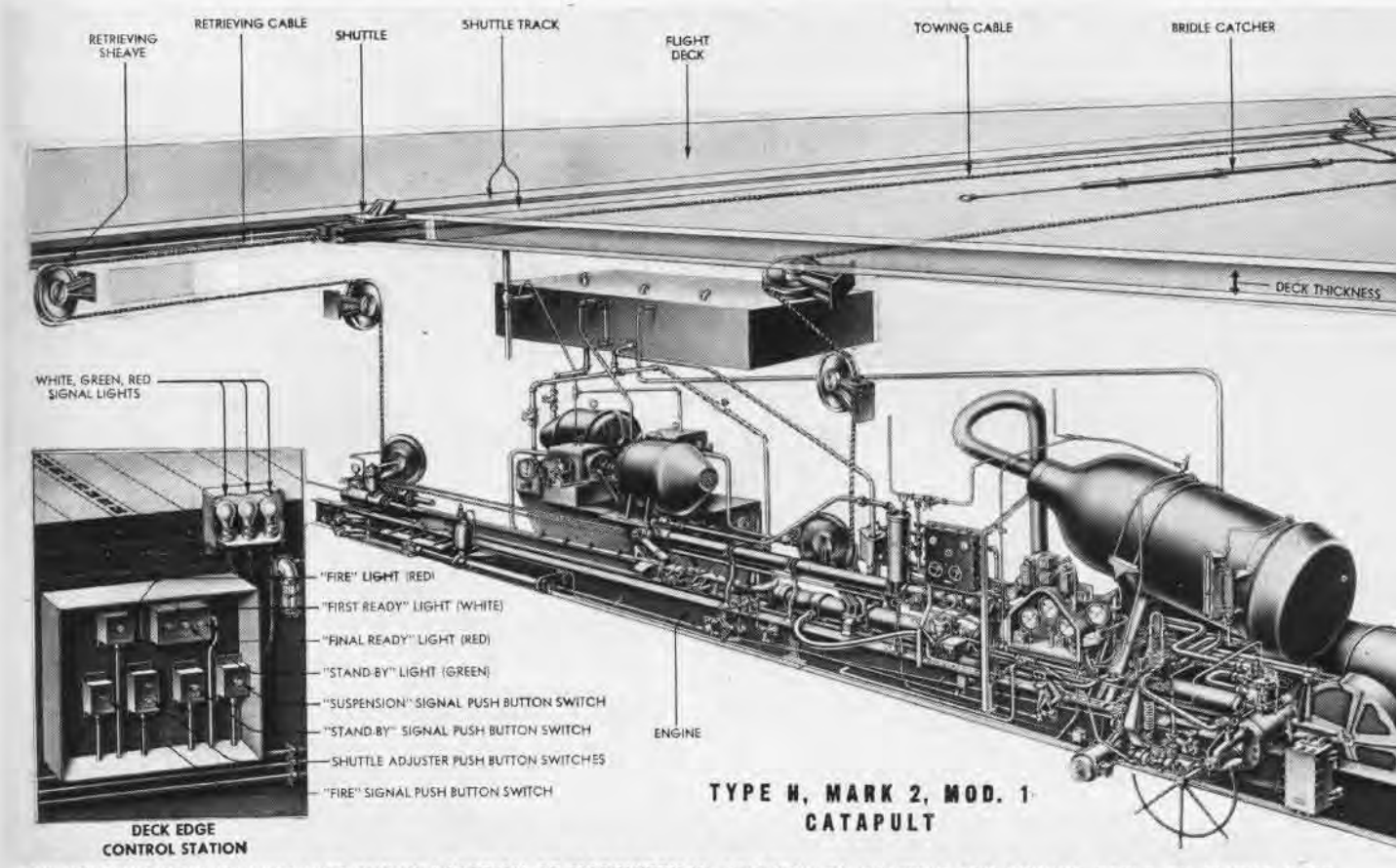
Natoma Bay catapults Army P-47 to bolster Saipan offense; these escort carriers, thanks to catapults, can carry whole deck load of planes

Yielding elements hold arresting gear wire off deck of *Yorktown* so that *Avenger's* hook will catch it. The LSO has given pilot the cut

GIANT CATAPULT LAUNCHES A MARINER FROM ITS LENGTHY RUNWAY



STUDENTS AT AIRCRAFT FACTORY REASSEMBLE ARRESTER VALVES



EXPLODED VIEW OF H2 CATAPULT SHOWS LOCATION OF MACHINERY IN RELATION TO SHUTTLE AND TOWING CABLE ON FLIGHT DECK

All CVE's and CVL's have 9 arresting wires, and at least 3 barriers. CV's and VCB's have 12 arresting wires and 5 and 6 barriers respectively. Barriers are attached to arresting engines the same as the wires.

Barriers have undergone considerable development at Naval Aircraft Factory to improve protection to planes parked forward, to lessen hazards to pilots, and to save planes that miss the arresting wires. Tests with surveyed aircraft have been conducted at the Factory at actual landing speeds to determine weak spots in the barrier or the plane. Development of a barrier that will stop the *Tigercat* with its tricycle landing gear is an example of the part played by NAF.

Arrested landing tests have been carried out by NAF personnel for years on experimental aircraft to iron out bugs in the arresting hook installation. The turntable platform at Mustin Field has seen much service in this phase of naval aviation.

A combination arresting gear and catapult was developed when it looked as though, early in the war, landing strips would have to be built on islands too small to site a standard-sized field. The HE type was similar in principle to shipboard arresting gear. The idea was that this gear, complete with a 450 x 65 foot wooden deck, could be set up on a small spot on some island and enable planes to land and be catapulted from a short space.

Both catapults and arresting gear are as old as naval aviation. Early box-kite airplanes usually required inclined planes, weights or some sort of added push to get them into the air. Wright brothers used this system, as did Langley.

Arresting gear has been in existence since advent of the first aircraft carrier, the old *Langley*. Without arresting gear to recover the aircraft complement, the carrier's striking power would be lost. Development of this gear began with sand bags and passed through weight lifting and friction drums to the present hydraulic type.

The first catapulted take-off was made at Washington Navy Yard by Lt. T. G. Ellyson, the Navy's No. 1 aviator, in October, 1912. Compressed air shot his Curtiss plane off at 35 mph.

EXPEDITIONARY UNIT, HE-1, CATAPULTED PLANES OFF SHORT FIELD AT

Naval Aircraft Factory Trains Crews To Operate Catapults, Arresting Gear

More than 3000 officers and enlisted men in the Fleet during the war called the Naval Aircraft Factory's catapult and arresting gear school their alma mater. It was the only school for training these specialists and its alumni operate the gear on practically every plane-carrying ship in the Fleet.

The one-month course given men in the school starts off with carrier indoctrination, telling the men something about the ships they will be working on and what their other duties are likely to be. Basic hydraulics study is followed by individualized training in which each man specializes in the branch of arresting gear or catapult to which he is assigned. He works on the particular type and learns the duties of the others on his "team" so he can substitute for any of them. Each catapult's crew usually comprises 8 men, while it takes as many as 29 to man the arresting gear and barriers on a large carrier.

During their schooling, students do experimental work on the field outside their classrooms, where all H2 type catapults and arresting gear components are tested before being sent to shipyards for installation in carriers. They learn about check-off lists, securing for launching, handling and positioning planes. They work on the landing platform at the H4 catapult and at the test pit.

During the war the school was under direction of Naval Air Material Center, growing from an informal operation with no organized classroom work to one with 12 enlisted and eight officer instructors and a highly technical curriculum. Last year the school turned out a number of cruiser and battleship catapult crews for work on powder-type gear. Training now is under NATTC and provides replacements for the fleet and teams to man new carriers or other ships still being built.

Although there is plenty of classroom work with diagrams and pictures, the students work on the actual catapults and arresting gear installed at Mustin Field. The school also trained British, Canadian and French crews since many of their U.S. built ships were equipped with catapults and arresting gear made in this country.

Catapults were not used much before the war. Ships had plenty of time to turn into the wind for deck launchings. They had sufficient deck space for long take-off runs. War demanded faster take-offs and this required planes spotted on the deck. Ferrying operations necessitated loading flight and hangar decks with planes.

Because catapulting was not used much in peacetime, the Navy's system of supplying parts also was not widely developed. Little was known about what parts would wear out fastest and need replacements. Because of lack of experience, it was difficult to stock parts that were required. One carrier in a war year launched more planes than the whole Fleet did in peacetime. On a shakedown cruise it would take more arrested landings in a day than it would have logged in a year.

So supply had to grow up with the war. In 1943, BuAer, BuOrd and BuSandA drew up a system for handling spares for catapulting and arresting gear, setting up bases at Norfolk, Bremerton, Oakland, San Diego, Pearl Harbor and Noumea. These secured their parts from Naval Aircraft Factory, which was fully responsible for supplying the entire Fleet with them. Pre-war sources had not the capacity to turn out the large volume suddenly required when our carrier fleet swelled from

Surveyed SB2A tests barrier cable suspension at NAF, being catapulted against it. Mobile arresting unit (Morest) can be seen on right

Training school students at NAF inspect cross-head sheave wheels on H4. Perfection of catapult boosted striking power of Navy flattops

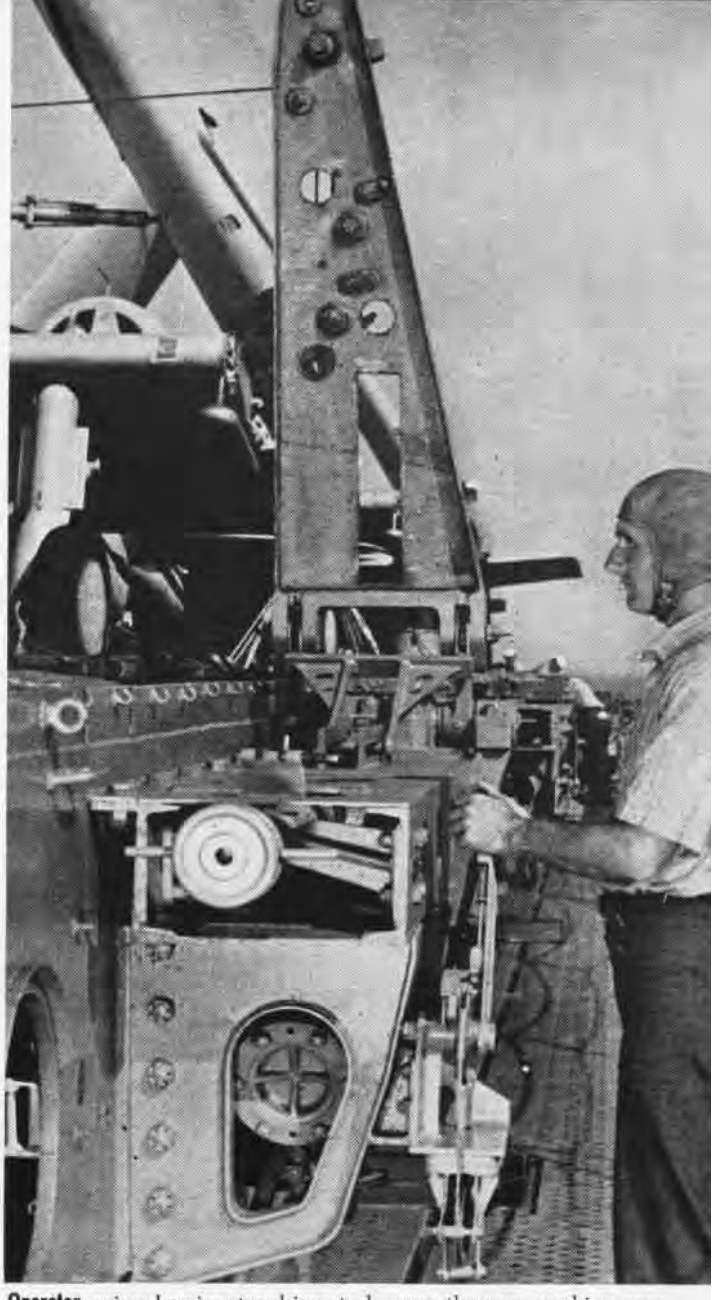
DUTCH HARBOR AND MADE POSSIBLE LANDINGS WITH ARRESTING GEAR

8 to 100 warships. NAF had to develop more sources and build many parts itself.

Espiritu Santo, Roi, Manus, Guam and finally Samar were added to the list of advanced bases supplying parts. Aviation supply ships were attached to the train of fast carrier task forces, ships like the *Grumium*, *Fortune*, *Webster* and *Allioth*. They would replenish their stocks from the advanced bases during lulls in action.

DURING the height of battle action, carriers did not always retrieve their launching bridles, short wires hooked to the fuselage of planes and used for tossing them into the air off the catapult. Some 50,000 of these bridles were issued to the Fleet in the past year and 6,500,000 feet of cable were used in the same period for barrier cables, deck pendants, bridles and other places on the catapult or arresting gear. Besides supplying the Fleet, NAF also furnished supplies for British carriers equipped with American-type catapults and arresting gear.

Although all other major combatants in the war used catapults, the United Nations were the only ones with hydraulic gear. Germany and Japan relied on powder and air types similar to early U.S. models. First catapults developed by the U.S. Navy were powered by compressed air. Not until 1925 was powder used to launch planes. If jet aircraft are adapted for carrier use, new take-off problems will have to be met because most jets require so much more runway for take-off. The German jet fighter, ME262, required 4000 feet of run, compared to about 650 for a TBF-type aircraft. A British jet plane recently made several carrier takeoffs and landings.



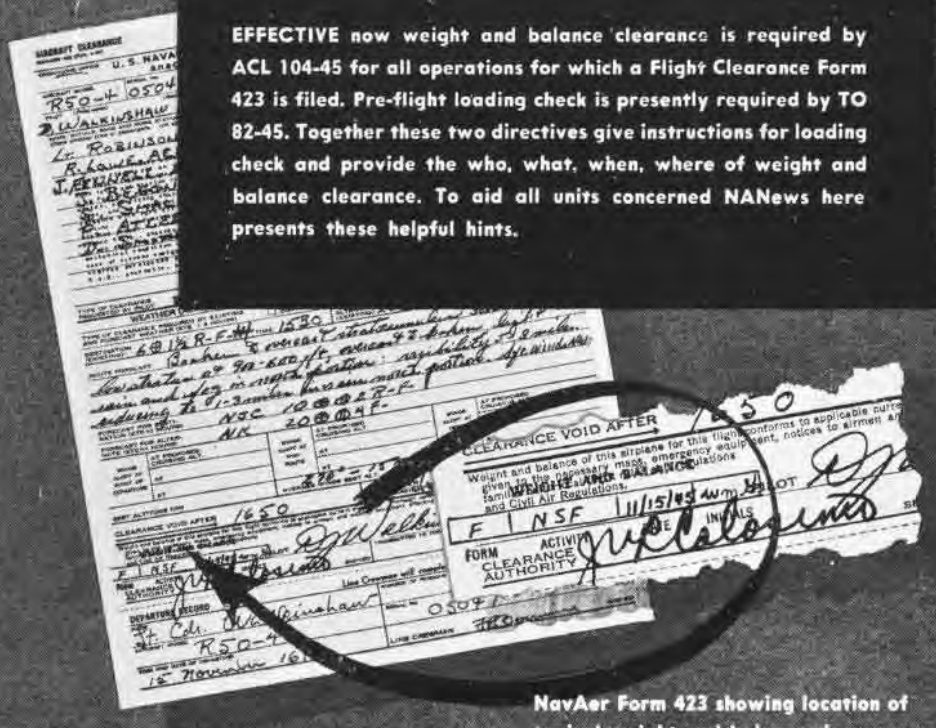
Operator raises barrier stanchions to be sure they are working properly, even though planes are not being brought in on flight deck

Randolph launching *Hellcats* for July raid on Jap homeland shows how a carrier catapults planes rapidly with only few seconds between

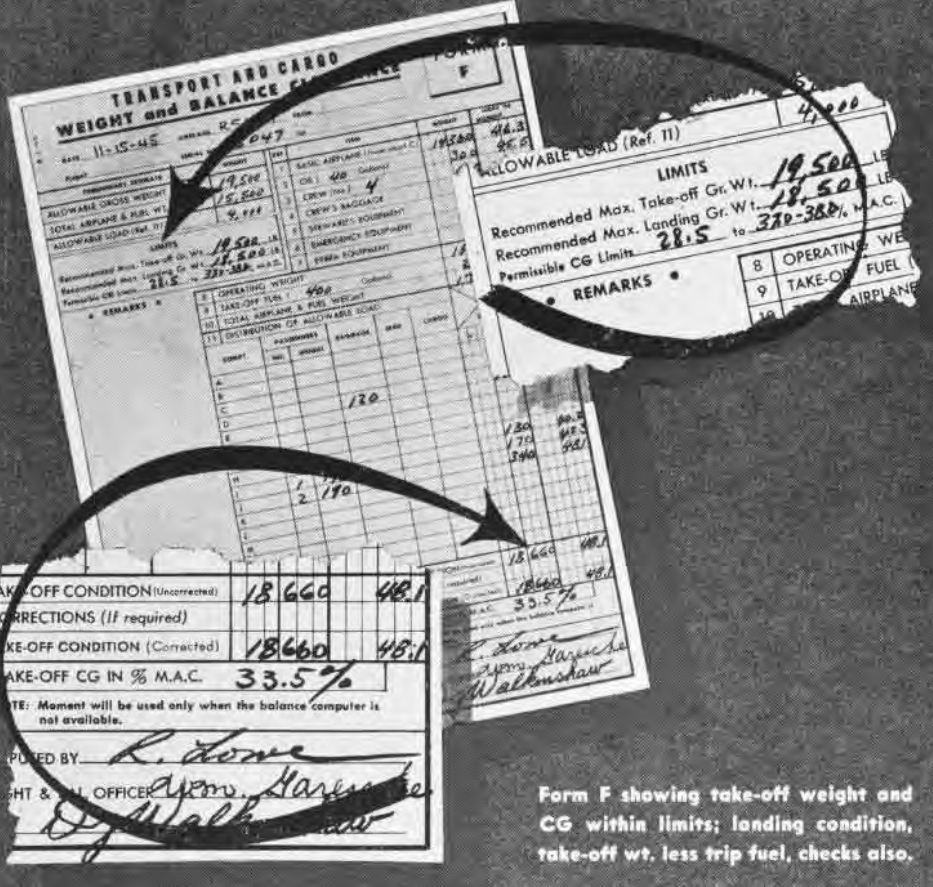
Students at catapult school at NAF, Philadelphia, disassemble piston valve on an H2 catapult. School is the only one to train such men

HINTS ON WEIGHT & BALANCE CLEARANCE

EFFECTIVE now weight and balance clearance is required by ACL 104-45 for all operations for which a Flight Clearance Form 423 is filed. Pre-flight loading check is presently required by TO 82-45. Together these two directives give instructions for loading check and provide the who, what, when, where of weight and balance clearance. To aid all units concerned NANews here presents these helpful hints.



NavAer Form 423 showing location of typical weight and balance clearance entry and the pertinent data required



Form F showing take-off weight and CG within limits; landing condition, take-off wt. less trip fuel, checks also.

QUESTIONS & ANSWERS

1 What are aims of loading check and Weight and Balance Clearance?

Checking of aircraft loads removes hazards of operating outside recommended maximum weight and center of gravity limits. Information required on the flight clearance form furnishes data for Aircraft Accident Reports.

2 Are any aircraft exempt from making pre-flight load checks?

Class 1A and single-seat Class 1B aircraft are exempted by TO 82-45. Weight and Balance classifications are given for all types of service aircraft in TO 83-45.

3 Who prepares Form F?

The pilot or a member of crew prepares Form F since it is definite pilot responsibility to correctly load and check his aircraft. Weight and Balance Officer will assist as his services are required.

4 Who prepares Authorized Standard Loading Form NavAer 2300?

Weight and Balance Officer of activity to which aircraft is attached prepares form after learning operational requirements from pilot or operations officer.

5 What about recommended Maximum Weights and C. G. Limits?

BuAer TO's entitled *Restrictions on Maneuvering*, as prepared for all aircraft types give maximum weights. The Weight and Balance Officer will enter these figures on the airplane's Chart E. Center of Gravity limits are given on the Center of Gravity graph of Chart E and on the Center of Gravity grid of the Load Adjuster.

6 When is a previously-filed Form F valid?

Only when load and basic weight are identical and form is dated within 90 days. If at 90 days basic weight has not changed, old form may be validated by changing date and advising activity holding original or by recopying.

7 Can ASL Form 2300 be used for Class 2 Aircraft?

Refer to forms and directives mentioned here when answering questions; for further information contact BuAer (Des

REGULATIONS

No, but several "F" forms filed in the Handbook are the same thing, only they are subject to review every 90 days.

8 Who fills in Weight and Balance block of Form 423?

Weight and Balance officer of activity to which aircraft is attached unless aircraft is transient, then block is filled in by Weight and Balance officer of clearing activity.

9 Should miscellaneous gear, baggage, and odd cargo be weighed before loading?

Yes, since weight estimating breeds accumulated errors. A convenient weight station in the operations office speeds loading of items. Good operations and Weight Unit combinations may be seen at *NAS Anacostia,* and at most Naval Air Transport Service Terminals.

10 How is loading corrected when found to be outside recommended limits?

Form F provides space for corrections. Passengers and/or cargo can be decreased when overweight or shifted to correct balance. Many activities should forego "full fuel tanks at all times" in favor of added payload for short-range operations.

11 Must loading be rechecked due to last-minute priority load changes?

Yes, unless lower priority load can be removed. Avoid situation by planning operations in advance.

12 Can aircraft without Weight and Balance data be cleared if Form 423 is required?

No, loading cannot be checked without basic airplane data. The data are available and should be installed in all aircraft.

The information presented here was selected to bring to light answers to some of those questions that have troubled flight personnel from time to time. Weight and Balance conditions are the most important contributing factors to safe efficient aircraft operation. Naval Aviation personnel cannot know too much about weight and balance, and their relation to safety.

ig: Coordination Branch)

SCREEN NEWS

Big Shot Deflated. Ethical considerations in personal conduct have an intrinsic importance wholly outside the fact of war. Therefore, even though hostilities have ceased, the first of a new series of films on conduct ashore has considerable current value:

MN-5010a *Conduct Ashore—Smart Boy* —Unclassified, 17 min.

The film is dedicated to bringing down to earth a guy with an inflated ego—and so is aimed at all men who throw their weight around with the irresponsibility of children, meanwhile getting badly burnt in the process.

SYNOPSIS: The scene opens aboard ship, with Smart Boy bragging about what he's going to do when he gets ashore. His best friend's warning to "quit being a hero and be yourself" rolls off his back like a duck. Stuffing a big roll of dough—7 months' pay—into his jeans, without benefit of money belt, and "borrowing" a buddy's combat ribbons, he launches himself ashore with a big splash and heads for the nearest bar.

He starts out nicely, clashing with M.P.'s and insulting a couple of "lousy civilians" who turn out to be veterans. His pal, listening to him boast about his string of gals and the joints he's going to "work", tells him off in disgust with "Go ahead, Junior—prove you're a man."

On his own, Smart Boy takes aboard all the liquor ballast his ample hold will accommodate and finally winds up in what proves to be his last port—the *Bulldog Cafe.* Here the bartender spots the wad of greenbacks and Margy, the perennial blonde, establishes a bleachhead for profitable operations. While he's telling her about his imaginary combat experiences, she lifts his roll and then ditches him with the adroitness of long and constant practice.

Authors of the film hope that the sadder Smart Boy is at the end of the show, the wiser will be those members of the audience who might be phony big shots in the making if given the same opportunity.

Dirty Work. The incorrigible MacGillicuddy has worked so hard and with such colossal stupidity to teach others self-protective horse sense, it would be entirely fitting to dedicate a statue to his name. As the Horrible Example in films featuring his wrong-way talents, Mac's role has taken many forms. His latest:

MN-2808f *Commandments for Health—Personal Cleanliness*—Unclassified, 5 min.

BO was a very intimate subject before advertising cast a commercial spotlight on the painful topic. In this film, the subject is anything but delicately handled to get the point across.

Working up a good perspiration (and odor) at a number of assigned routine tasks, the members of Mac's outfit find a bath in order, after work. They shed their silt and sweat in a handy brook—all except Mac, who is too tired to think and too dumb to dunk.

Inevitable result: MacGillicuddy is promptly and effectively ostracised. Isolated and stewing in his own juices, Mac

WHERE THERE'S WATER, THERE'S A BATH

finally is "liberated" by natives who give him the scrubbing of his life in the community kettle.

Other Films Shipped:

MN-1327ac *Flight Characteristics of the SC-1 Airplane—The Seahawk* — Confidential, 12 min.

MN-3224c *IFF Operation AN/APX-8* —Confidential, 13 min.

MN-5816a *Jet Assisted Take-Off for PBM Aircraft* — Restricted, 25 min.

MN-5816b *Jet Assisted Take-Off for PB2Y Aircraft* — Restricted, 18 min.

MN-4089a *The 20mm Automatic Gun T31 (M3) Operation* — Restricted, 20 min.

MN-4089b *The 20mm Automatic Gun T31 (M3) — Installation and Maintenance* — Restricted, 12 min.

MN-4347 *Aerial Tow Targets* — Restricted, 21 min.

SN-3388e *Mark 18 Gunsight — Maintenance-Unit by Unit Test* —Restricted, 68 frames

Where to Get 'Em. Central Aviation Film Libraries and Sub-Libraries are listed below:

NAVAL

NAMTD, NAS Memphis
CASUs 2, 31, 32, F42
ComAirPac
ComAirSubComFwd-Area
Hedron TWO
NAB Seattle
NAMC Philadelphia
NAOTC Jacksonville
NAS Atlanta
NAS Grosse Ile
NAS Kodiak
NAS Moffett
NAS New York
NAS Patuxent
NAS Quonset
NAS San Diego
NAS Navy ☨115
NAS Navy ☨116
NAS Navy ☨117
NAS Navy ☨720
NATB Pensacola
NATB Corpus Christi
NATEC Lakehurst
Navy ☨3233
TAL, NOB Norfolk

MARINE

MCAD Miramar
MCAS Cherry Point
MCAS El Centro
MCAS El Toro
MCAS Mojave
MCAS Navy ☨61
MCAS Parris Island
MCAS Quantico
MCAS Santa Barbara

GRAMPAW PETTIBONE

Cross-Country Accidents

Aviation Circular Letter 133-45 points out that accidents during cross-country flights are increasing. One of the principal underlying reasons is considered to be the return of so many Fleet pilots to shore activities. It is pointed out that these pilots have been flying under combat conditions where they were expected to complete any mission on which they were dispatched, accepting hazards as necessary. This attitude fostered by the Navy was considered inevitable in war. Now it must be tempered with caution and good judgment.

Fleet pilots have acquired great skill in techniques essential for their highly successful part in destroying the enemies wherever found. In order to train pilots in the shortest possible time for wartime duties it was necessary to omit from the training syllabus anything that did not pertain to fighting. But now with many pilots returning to shore duty where they are expected to participate in extended flights over land, it is essential to train them in proper weather briefing, radio range flying, Civil Air Regulations, and all other phases of cross-country flying. At present, the responsibility for insuring that this training is given rests on unit commanders. While close supervision of cross-country flights is imperative, it is emphasized that mere restrictions against flying do not accomplish the desired result.

Aviation Circular Letter 134-45 sets forth the following guide to be used by commanding officers in authorizing cross-country flights:

(a) Weekend flying shall be adequately supervised by the commanding officer of the unit involved, who shall satisfy himself that such flights are bona fide training flights and not flights of convenience.

(b) It is not desired to discourage weekend cross-country flying provided such flights can be conducted for official purposes only or for familiarization of pilots with local areas in which they will operate.

(c) When a weekend flight is authorized, the pilot involved must be thoroughly briefed that safety of flight is paramount and no attempt should be made to return unless weather along the entire route is within limits imposed by the pilot's instrument qualifications and equipment of the aircraft.

(d) Pilots authorized to make weekend cross-country flights shall be thoroughly familiar with Civil Air Regulations and pertinent instructions issued by competent authority. Particular emphasis shall be placed on choosing routes that permit every reasonable precaution against such contingencies as shortage of fuel due to unexpected weather and forced landings from other causes.

This nose-up doesn't look very serious, does it? Look again! A&R estimated it would cost $10,000 to put this F6F back in the air—five years' base pay of the pilot who caused the damage.

It occurred in the normal manner—the pilot neglected to "S" turn and then slapped on his brakes to avoid cutting up the airplane that was ahead of him.

Glamor Is As Glamor Does

An SB2C pilot had to make a forced landing due to a sudden drop in manifold pressure. Fortunately he found a cleared area and was not seriously injured.

Investigation disclosed that the basic cause of this accident was due to negligence on the part of maintenance personnel. The linkage from the throttle control to the carburetor had become disconnected at the carburetor when the castellated nut backed off because *it was not safely wired at the time the carburetor was changed.* The plane had flown 17 hours since this change had been made which was sufficient for the castellated nut to vibrate off.

Grampaw Pettibone Says:

Maintenance is a tough game—lots of work, long hours and very little glory. Don't think that maintenance crews have to wait until the "hereafter" for their reward however, good mechs get their reward every day. It's a real satisfaction to see the plane you've worked on come humming back from each flight. It's proof that you have done a good job.

I heard of an *Avenger* that was ferried from a jeep carrier to a jeep carrier in mid-Atlantic last year; after landing safely aboard its new home the replacement plane captain found this touching note from its former "owner":

"This here is the *Oklahomer Rose.* She dun flew seventy missions this cruze and she ain't missed a beat. Pleze take good care of her like I dun."

(s) *Her plane captain*

The grammar may not be up to snuff, but this plane captain and his *Oklahomer Rose* represent the spirit and the performance we need among maintenance crews.

It takes a little imagination to put glamor into your work. When you stop to think how serious the results of any mistakes on your part can be, however, it doesn't take much intelligence to realize that you who are "meching" and checking planes hold positions of great responsibility in naval aviation. This responsibility demands your best: infinite pains plus careful attention to every detail. The lives of your shipmates depend on your eternal vigilance. Don't ever let them down!

SURVIVAL TRAINING PAYS OFF IN EMERGENCIES

Pilots and aircrewmen can never afford to slight survival training. A thorough grounding in correct survival technique was life assurance for the crew of this Avenger *when it crashed on take-off from a Third Fleet carrier during the closing days of the Pacific war. As soon as their plane hit the water the pilot and his crewmen were climbing out of the aircraft. Survival training can pay off in lives saved during peace time operations as well as in war. Ditching bills and survival techniques are based on exhaustive research and experience and are specifically designed to save lives of aviation personnel in all emergencies.*

The Reaper Gets the "Pushers"

Returning from a routine flight, an SNB pilot flew into deteriorating weather (lowering ceiling accompanied by freezing rains), as he neared his base field. Upon reaching the vicinity of the field, he found a ceiling of 200 feet. En-

gine and wing icing were giving him considerable trouble. After many exhaustive but unsuccessful efforts to find the field, he requested tower to advise him of nearest contact field. He then departed for the alternate, which by the time he arrived, also had closed in with a ceiling of 300 feet and ⅛ mile visibility. One engine was almost out due to icing. Fuel was low. After several hair-raising attempts to get into the field, during which he narrowly missed a hangar and stalled at 300 feet, barely recovering before striking the ground, he managed to land. The wheels struck a snowdrift, turning the plane over on its back.

The ISIC said:

"When returning to base, this pilot left an area of contact weather and entered an area of increasingly poor visibility, low ceiling, heavy snow and freezing rain. He elected to stay in this area, and attempted to land at his base field under impossible conditions. He then delayed his decision to fly to an alternate field until his fuel was low, one engine almost out and propellers and wings badly iced. The pilot violated Contact Flight Rules and almost paid with his life.

"The stage was set for this accident, when, prior to take-off, the pilot failed to acquaint himself with the latest weather sequences and forecast for the area. Had he done so he would have been able to avoid bad weather and would have had an alternate airport in mind."

***Comment*—There have been a large number of recent accidents similar to this one—many of them fatal. All of the pilots involved were violating Contact Flight Rules under which they were cleared for flight. They were trying to "push through" bad weather and either flew into rising ground, or lost control and crashed. In not one single case was there real justification for the pilot to risk continuation of the flight through adverse weather. All of the pilots passed up alternate fields where they might have landed and awaited better weather.**

Fatal Spins

"I was behind Ed—I mean Lt. — — in the landing circle and saw him start his final turn toward the field. Right in the middle of the turn, his left wing seemed to drop out and the plane dove into the ground and burned. It looked to me as though he got too slow in the turn and spun in. . . . One thing more might help the Board in analyzing this accident . . . Lt. — was in the habit of making his approaches slower than necessary. He said he preferred a slow approach and seemed to pride himself in being able to make them without any trouble."

This case as told to the investigating board by a witnessing pilot is an example of the spin-stall accidents that result in so many fatal accidents in naval aviation. The latest statistical report shows that in the last six months spin-stall accidents have increased both in number and in proportion to other types of fatal flying accidents. The most striking feature of these crashes is that so many took place during field landing approaches. In terms of hours flown they occurred at a rate exactly double the incidence of such accidents during the preceding six months. All general stages of training showed an increase in stall-spin accidents.

For the most part, inadvertent stalls and spins are the result of careless, sloppy flying or a lack of understanding of the aerodynamic factors that cause an airplane to stall. To stop these needless accidents with their resultant loss of life and equipment, all pilots must be impressed with the seriousness of the situation. Safety officers are urged to execute an elaborate campaign toward this end. Posters, lectures, bulletins and movies all are good mediums. *Flight Safety Bulletin No. 21-44* should be thoroughly understood. Flight Safety film MN 4353(A) entitled *Spins and Stalls* should be seen by all pilots.

GRAMPAW'S SAFETY QUIZ

1. **During simulated instrument flight in solo aircraft, if the hooded pilot does not hear from the safety pilot at the end of a 3-minute interval, what should he do?**
2. **The oil dilution system is used prior to stopping the engine when outside air temperatures below 35°F or 2°C are anticipated before or at the time of the next start. True or False?**
3. **The air-traffic rules established by the Civil Aeronautics Board are binding on naval personnel. True or False?**
4. **Why should cowl flaps be open after stopping engine?**
5. **Who is responsible for the application of the weight and balance control requirements?**

(Answers to Quiz on Page 48)

Safety in Altitude

Case 1. After finishing a gunnery training flight, a group of fighters in column commenced a shallow dive at 2000 feet, the leader recovering at 500 feet. The tail man pulled out considerably lower than the remainder of the group and at the bottom of his recovery, flew into high tension wires that were stretched across the river at a height of 120 feet. The airplane immediately went out of control and crashed.

Case 2. Following a gunnery hop a formation of eight F4U's began losing altitude in a steep gliding turn. At 300 feet, they leveled off, all that is, except the last man. He failed to pull out in time and flew into the ground.

Grampaw Pettibone Says:

A flight leader must watch out for the safety of his entire group at all times. Before starting any low altitude maneuver he must be sure that every member of his flight will have sufficient space to make a safe recovery. This must take into account the tendency for succeeding pilots in step-down formation to pull out at lower and lower altitudes.

At the same time, no wingman can afford to overlook his own safety. He should always check his altitude and if he sees it is going to be a close call, he should pull out of formation before he gets into a position from which he can't recover.

As far as I'm concerned any flight leader who so maneuvers his group that anyone following him has to break formation in order to avoid flying into something—that guy shouldn't be allowed to lead another group until he's gone back to flying wingman for a few months and acquired a proper sense of responsibility.

Late To Class

A TBM pilot allowed his fuel tank to run dry while operating at low altitude. He immediately shifted tanks and started his auxiliary fuel pump, but since there was insufficient altitude to regain suction, he was forced down at sea.

The pilot's statement included the following: "A good lesson I learned is to switch gas selector valve at a higher altitude. There is too little time to act at 75 feet."

Grampaw Pettibone Says:

I refuse to get mad at this pilot; this type of accident has happened so often I've exhausted my indignation! I'm glad he finally got the word. But it's tough to have to watch pilots learn everything the hard way. In this case, a little serious attention to *Flight Safety Bulletins 7-44 and 25-44* would have taught him the same thing and at a much cheaper rate, to say nothing about the real danger involved.

Mid-Atlantic Base

NAVY *Liberators* flew anti-submarine patrols from the historic Azores islands the last 10 months of the European war, in close cooperation with Royal Air Force patrol planes of the Coastal Command.

The fact that U.S. planes were based on the neutral Portuguese islands has been revealed for the first time by the Navy. They flew from Lagens Field on the island of Terceira, 2164 miles east of Bermuda and 1210 west of Gibraltar, protecting the Mid-Atlantic area against the Nazi submarine raiders.

The whole combat venture involved diplomatic planning since the islands belonged to a neutral country. U.S. planes were admitted to assist the British, who themselves came to the island under an ancient Anglo-Portuguese treaty of friendship. They flew side by side with English, Australian, New Zealand and Canadian pilots, frequently alternating plane for plane on operational missions.

Operations were under control of the Coastal Command and the Navy planes bore the white star insignia of the United States and the blue, white and red bull's-eye of the RAF. The Navy's planes flew thousands of night hours, beginning in the summer of 1944, to protect vital central Atlantic convoy routes. Planes from Africa and Gibraltar met the Azores planes and gave full protection to ships bound for the Mediterranean area.

Seabees built a big port at Praia, formerly just a fishing port, so that supplies for the airfield could be landed without having to transport them over 15 miles of mountain road from Angra. Army engineers built the airfield. The Navy built its camp on a ridge over the field, established a base radio station to facilitate communications with surface craft escorting convoys.

Terceira also was an important link in the Naval Air Transport Service's transatlantic link. R5D's began a regular schedule of mail, freight and personnel through the Azores in January 1944. First Navy *Liberators* arrived by the end of July and began night operations against submarines, with British planes handling the daytime patrols.

PHOTOGRAPHY

Fairchild Report on Shutter Trouble

An RUDM on the breakage of the cam stop trip lever assembly in the K-18 camera shutter has been referred to the Fairchild Camera and Instrument Corporation, and the following report has been received:

"It was found that in assembling this part, a critical adjustment is necessary to insure proper locking of shutter and camp stop lever. In a few cameras, this fitting operation, which consists of cutting the cam stop trip lever assembly to the exact shape of the stud, which it retains, may have been carried back too far, resulting in breakage reported.

"To insure the part in question being strong enough in future cameras, the Engineering Department has changed the design, making the part much heavier."

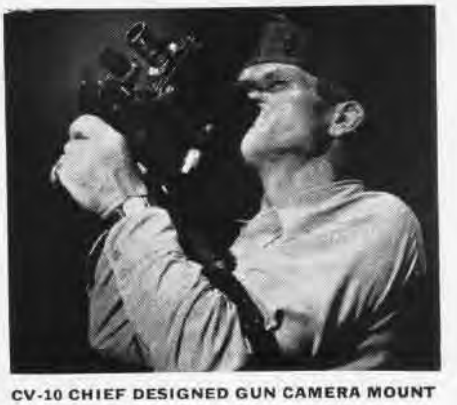
CV-10's Mount for 16 mm Gun Cameras

CV-10 has reported to BUAER the development of a gun-stock and trigger arrangement for mounting 16 mm gun cameras for action photography. Two cameras are attached to the stock, one with a standard 35 mm lens and the other with a three-inch lens for telephoto work. The pistol grip controls electrically the simultaneous operation of the two cameras (*see cut*).

The gun-stock is equipped with an adjustable arm sling to insure stability in operating the cameras. A six-foot electric cable allows operation within an aircraft or from a 24-volt battery for ground work. A reversed 35-mil gunsight is attached to the gun-stock and acts as a viewfinder.

This camera arrangement was developed by Ronald Woodward, CPhoM USN.

ComAirPac has suggested that this camera arrangement, operating at 64 frames per second, be used to photograph carrier flight deck operations and has requested that a report and examples of results be forwarded to BUAER. Cine Kodak Specials have been established by BUAER as standard for this type of photography aboard CV's and CVB's. Comments on the use of gun cameras for covering flight deck operations and training exercises are invited.



CV-10 CHIEF DESIGNED GUN CAMERA MOUNT

LORAN
Long Range Navigation

LORAN TRANSMITTING STATIONS ARE LOCATED ON PROMINENT COASTAL POINTS GIVING EXTREME EFFECTIVE RANGE AND ACCURACY

Loran Navigation System Makes The Pilot's Work Easier Gives Long Range, Pin Point Accuracy, Is Simple To Learn

DEVELOPED as a top secret wartime weapon, Loran provides a reliable, fast and effective system of long range navigation geared to meet the needs of a jet-propelled atomic age.

Loran navigation is fast. Using Loran, a Navy aerial navigator on a routine check hop from Miami to Bermuda and return was able to log 54 fixes! In two minutes the average Loran operator can obtain readings that provide a line of position and a fix. The system gives accurate positions within one percent of the distance of the transmitting stations. Navigators can be trained to determine Loran positions in one day, proficiency comes with constant practice.

Loran navigation is also accurate. In the Aleutians one of the first Loran installations was on a small charted island. In the first tests operators at both transmission points and at the receivers were amazed to find that time and again their readings were wrong. Experts were brought in, charts were checked and more readings were taken but Loran wouldn't lie. Further checking proved that all existing charts of the area were inaccurate. The island was nine miles out of position on all the charts. Loran had been right!

Loran has proven reliable in daytime operation for distances up to 800 miles and up to 1400 miles for night operation. A wave length, similar to that used for long range radio communication at night, is employed. Speed and time of travel of radio waves is a relatively stable and reliable measuring factor permitting definite measurement of Loran signals. Actually an accurate knowledge of position is available from minute to minute. Position knowledge is delivered in the form of lines that have definite unchanging position on the earth's surface.

To state the concept of Loran in its simplest form is to say that use is made of high pressure radio pulses transmitted from stations situated at prominent points along a coastline. The arrival of these pulses and difference in time of their arrival in the airplane is the measurement the navigator uses to plot his position on a specially prepared chart. This navigational system works then on three integral elements:

1. A series of radio transmitting stations based on prominent points along a coastline.
2. Receiving and time measuring equipment carried aboard an aircraft.
3. Loran Plotting Charts. These charts have been especially prepared for use with the Loran system and are so arranged that Loran readings are quickly converted into positions on the charts.

SHORE based transmitting stations are located on coastal promontories 200 to 300 miles apart. A line drawn between two stations would be over water. One station is designated as the *Master* and the other is called the *Slave*, because its pulsed radio signals are keyed to the *Master* station with the proper time lapse intervening.

The Loran system is primarily designed for overwater navigation. Electromagnetic radiation emanating from the transmission stations sends out distinct ground and sky waves. During daytime operation the ground wave will service an area of 600 to 700 nautical miles. This is cut down to about 400 miles at night. These figures represent the area where the most reliable signals can be received. Sky waves are received effectively only at night

Installation in plane is simple and provides operator easy access; at present Loran gear is too large for use in single engine aircraft

Loran Scope is readily visible and always presents clear picture of signals; operator can stop pulses by adjustment of tuning knobs

when the effective range is approximately 1200 to 1400 nautical miles.

Incoming Loran signals are picked up in the plane by a superheterodyne type receiver that amplifies incoming signals as they arrive on a pre-tuned frequency. Receiving equipment is turned on and off simply by throwing a toggle switch.

Loran equipment is now used only in large planes, such as patrol bombers, and patrol type craft. The system does not require use of chronometers, magnetic or gyro compasses or use of mathematical formula for determination of position. Loran is self-sufficient and independent of all other navigational gear. It may be used in daylight, at night or in twilight, and in contrast to RDF equipment Loran's accuracy is not altered by "shore effect" or "night effect".

Most important electronic characteristic of the Loran system is the special type of pulsed signal that is used. Unlike standard radio, Loran does not use continuous wave transmission. Instead it makes use of a pulse transmission system that permits measurement of time and travel of radio signals. Not a radio direction finding system, Loran is more properly classed as a new means of radio position finding. Its high degree of accuracy results from the rate of radio waves being more stable than any other radio wave propagation. World coverage by Loran could be effected with approximately 150, strategically located stations.

A special type of chart is provided whereon Loran readings are directly convertible into lines of position marked on the map. The chart, actually a Mercator map having a scale of fifteen miles to the inch, is made with superimposed Loran curves. Each spot on a coast, each harbor, each airfield has a Loran line of position running through it. For each line of position on the chart there is a corresponding frequency on which the Loran radio pulse can be accurately read on the indicator.

Transmitting stations operate even in remote island areas providing homing facilities and accurate lines of position for many of world's previously uncharted ocean areas

DIFFERENCE IN TIME OF RECEPTION FROM PAIR OF STATIONS DETERMINES LORAN FIX

Loran Cuts Down Prayer Time, Gives Pilot 'Seeing Eye'; Will Compare Favorably With RDF Systems Previously Used

AN AIRCRAFT may be steered along a Loran line of position by watching the indicator much as a ship's navigator watches his compass. When the receiver is tuned the navigator receives a radio pulse from a master station closely followed by the pulse of the slave station. Time difference between the two pulses, computed in millionths of a second, is the reading a navigator uses to determine his fix. If the Loran receiving equipment is set for any particular line and left alone it will show instantly whether the plane is on the line, or bearing to right or left.

On a navigation hop out of Banana River a Loran instructor demonstrated the system's homing characteristics by pin pointing the Cape Canaveral lighthouse off the Florida coast. This accurate piece of navigation was accomplished by lining up the two pulses as they appeared on the Loran scope and keeping them lined up for 22 minutes without deviation.

Directional distortion is eliminated in Loran as no bearings are taken on transmitting stations. A Loran three line fix can be obtained in three to five minutes, whereas a three line celestial fix takes 20 to 25 minutes. It is possible to *home* to any geographic point covered by a Loran line of position whereas a plane using only RDF equipment is restricted to the location of the transmitting station (though RDF is good for short ranges).

An enemy plane cannot make use of Loran charts without first knowing the necessary coding delay. Since no transmission of any sort is required from the aircraft, radio silence can be maintained at all times. Enemy counter measures can jam Loran locally although detection of a Loran transmitting station by the enemy is difficult since all stations in an area operate on one frequency.

Adverse weather has had little effect on Loran in tests. While in some Pacific areas Loran signal reception has fallen below par at given periods, the exceptions actually are phenomena of propagation rather than drastic failures of the Loran navigation system.

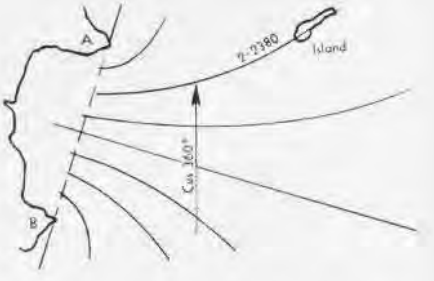
Because radio waves travel at a constant rate of speed and the time measurement is actually made in terms of fractions of seconds, it is possible to measure time difference between two pulses and convert them to lines of position.

Traces come across the scope with definite delineations. Radio waves carrying the pulses are so regular that it is possible to break down the timing to a count in terms of microseconds. By counting the number of microseconds difference between two pulse signals as they appear on the trace in the scope the navigator determines the line of position between two transmitting stations. This reading, transposed on to the special Loran charts gives the navigator his fix.

THE LORAN indicator is a precision instrument designed to measure time accurately down to a single microsecond. Because indicator parts are so delicately balanced that extreme changes in temperature and humidity may throw them out of adjustment, it is almost mandatory that the indicator be calibrated before each flight. The indicator can be calibrated either on the bench or in the airplane.

One of the newer possibilities of Loran is its effectiveness in connection with search and patrol of designated areas. If Loran service is available a complete set of lines of position cross the area. It is a simple matter to sweep that area by following one line of position after the other in "lawnmower" style.

Work was started on Loran in 1941 and by the end of 1942 the first of a group of ground stations, destined to interlace the world electronically, was in operation. When the military value of Loran was definitely established the

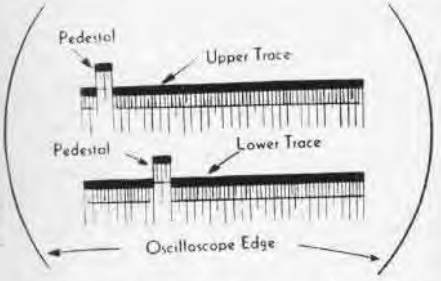


Navy assumed control and assigned the construction and operation of stations to the Coast Guard.

Loran went into operation against the enemy in September 1944. An Eighth Air Force Photo-Reconnaissance Squadron used Loran in all its operations. As confidence in the system grew over 500 airplanes were equipped with the gear and the scale of Loran navi-

gated raids steadily increased. The probable error in the Berlin area proved to be about one and one-quarter miles, a figure slightly better than those obtained during tests of Loran.

Solution of the problem of accurately measuring time differences in the arrival of pulses at a navigator's position is a tribute to the effectiveness of military-civilian coordination. A system was required that would enable the navigator to measure the time difference to the nearest millionth of a second, despite interference resulting from enemy jamming or weak signals. The problem was solved by staggering transmitted pulses and then presenting them on the two trace Cathode-ray tube indicator so that sections of traces on which the pulses appear can be selected and compared separately on a



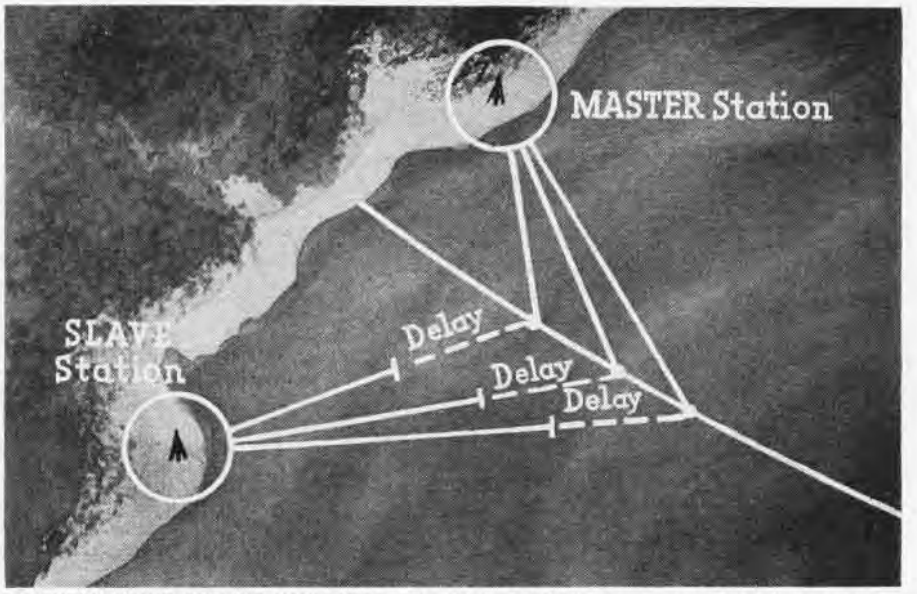
greatly expanded time scale. This method permitted the precise matching of pulses and, finally, the measuring of the expanded portions of the sweeps by counting the time marker pips.

PEACETIME applications of Loran holds promise of broad new vistas for the world of air transport. Design changes and improvements may produce Loran at lower cost and in a size adaptable to smaller aircraft.

One of the many features of the application of Loran has been the development of air-transportable ground station equipment for tactical use. The first experimental units were shipped to India for use in operations over the "Hump" to China. The equipment operated successfully on both sides of the Himalayas right up to V-J Day.

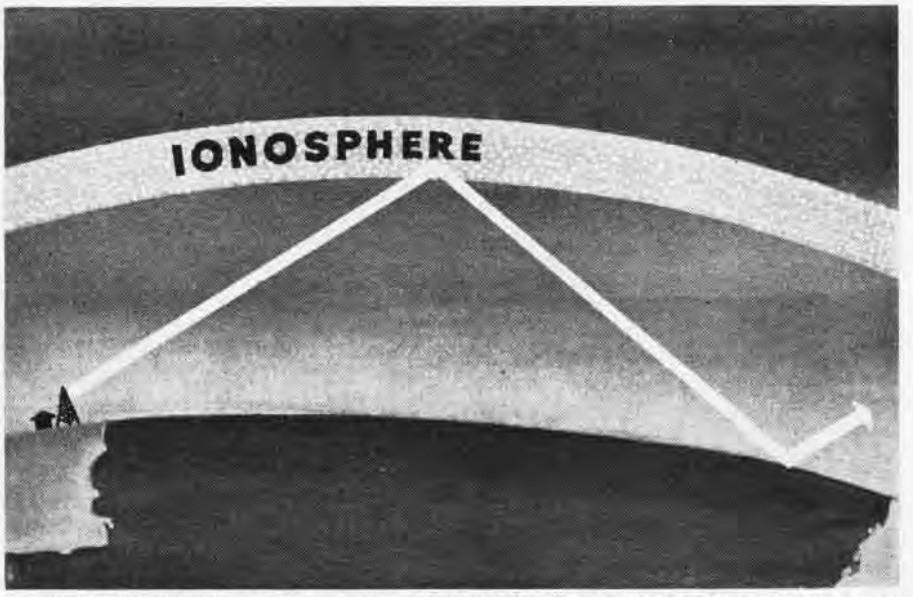
To increase effective ranges work is now underway on use of low frequency ranges for Loran reception. An experimental frequency of 170kc. has been allocated for these tests. Experimental stations have been set up along the east coast but because of their temporary nature it was decided not to erect the large towers that are usually necessary with shore based Loran transmitters. Instead, barrage balloons supplied by the Army complete with crews, are being used to support 1300-foot single wire, vertical antennas.

The peacetime application of Loran is under study by commercial airlines and U.S. Army and Navy laboratories.



AT EVERY POINT ON LINE NAVIGATOR RECEIVES SIGNALS FROM MASTER STATION FIRST

RANGE OF LORAN TRANSMITTERS IS GREATER AT NIGHT THAN DAY DUE TO SKY WAVES



AT NIGHT SKY WAVES PERMIT LORAN TRANSMISSION TO EXTREME RANGE OF 1400 MILES

AR-8 AIRBORNE LIFEBOAT

THE NAVY has made available to ComAirPac 50 of the new AR 8 airborne lifeboats for use with the PBY on rescue missions and possibly with PBM's. Two of the 18-foot lifeboats can be dropped from the Mk 35 or 51 bomb racks with no modifications or special rigging to the PBY wing.

The lifeboat weighs 1400 pounds and will hold eight men comfortably. It carries in it a one-cylinder five-hp inboard engine that will enable it to make five knots. Besides its engine and sail, the AR-8 comes equipped with electronic and visual signaling devices, water and watermaking kits, food, blankets, clothes and other gear.

On the plane, it has horizontal fins on the stern to improve airborne stability when dropped with its eight parachutes. The boat is made of five-ply molded mahogany plywood and is compartmented so one man can right it if it capsizes on landing.

THREADED RODS AID IN SECURING AR-8 TO INBOARD BOMB RACK OF A NAVY CATALINA

The boat attached to the wing cuts the air speed of the plane five to seven knots. A PBY with one boat and 1400 gallons of gasoline has a range of 1500 nautical miles. With two boats and 1200 gallons, range is 1200 miles. The boat itself has fuel for 250 miles.

The AR-8 can be dropped from inboard internal wing racks electrically or manually. Recommended air speed and altitude for the drop is 10 knots either way from 100 knots and 50 feet leeway at 400 feet.

In dropping to survivors in rafts, boat should land downwind of them; if they are swimming it should be on their upwind side. Recommended procedure is for the rescue plane pilot to drop a float light on the first run and use it as a target for dropping on the return run.

Two threaded rods hold the boat on the bomb racks. Upon release static cord opens the standard 24-foot chutes, specially packed in two four-chute packs; the boat drops 25 feet a second.

DID YOU KNOW?

School Moves To NAS Glenview

New Orleans Needed For Demobilization

The Primary Flight Instructors' school has been moved from New Orleans to Glenview, Ill., and facilities at New Orleans are being utilized as a separation center. Full use of the Lakefront Naval Air Station, New Orleans, was needed for demobilization. However, after demobilization is complete, there are plans to utilize the station as a reserve aviation base for training reserve pilots.

Organized as a Naval Air Station, February 4, 1943, the New Orleans facility graduated more than 4,000 flight instructors, many of whom served in combat with distinction. The school was credited with raising flight instruction to the highest standard achieved in the history of the naval aeronautical service.

British Seadrome Rides Waves

Flexible Landing Strip Made Up of Cans

A floating seadrome capable of remaining flat in waves up to 26 feet from crest to crest was developed by the British during the war. Information on the "landing field," called "Lily," has been released after being highly classified during hostilities.

The seadrome is made up of buoyancy cans with hexagonal surfaces, linked together so that they ride the waves and remain sufficiently rigid to take the weight of a heavy aircraft. A "Lily" 2500 feet long could be transported in three merchant ships.

Rise and fall of the cans is controlled by underwater dampers. They can give, in a controlled manner, to the motion of the sea in any direction and still be rigid enough for landings, according to the Royal Navy release.

MID-OCEAN SEADROMES MAY BE POSSIBLE

MONTHLY NEWS REPORTS

In order to insure service-wide representation in NAVAL AVIATION NEWS, commanding officers of all ships, stations and units concerned with aviation are directed to submit monthly news reports to Chief of Naval Operations.

Instruction for the submission of these monthly news reports and information concerning material to be included in them are contained in ACL 128-45 dated 8 November 1945. (*See inside back cover.*)

Opportunity Open for Aerologists

Qualified Personnel Can Attend Schools

Weather officers with a mathematics or engineering undergraduate major now exploring employment possibilities might well consider a full calendar year or more of graduate training in mathematical and applied statistics in a college offering advanced degrees in that field. The demand for competent and well trained statisticians could not be met before the war, and as a result of the war experience, that demand is greater now.

For example, the Weather Bureau needs men trained and experienced in meteorology who also have the equivalent of an advanced degree in modern statistical methods. People with this background, not available today, are needed not only in developing objective, engineering methods in forecasting specific weather elements for selected locations, but also in modernizing and revitalizing a useful science of climatology. With this combination of training a man would be fitted for a position as consulting meteorologist or climatologist with a large industrial concern or public utility. Each of the fifty-odd agricultural experiment stations should have an agricultural climatologist on its staff since primarily the climate, soils and markets of an area determine its agriculture. The Weather Bureau also needs agricultural climatologists.

Iowa State College, North Carolina State College and the University of California, are offering advanced courses in climatology. There are a few other Universities that offer advanced degrees in mathematical statistics, such as Princeton and Columbia, but the interest in the application to problems in meteorology and climatology has not yet been developed to any great extent.

Navy Wipes Out Brothers Ban

Family Members Can Be on Same Ships

The wartime ban on members of the same family serving on the same ship has been lifted by the Navy. The ban also had applied to the same station in an advanced base area.

Naval training centers now can transfer recruits to ships of any fleet, except submarines, in which their brothers are serving. No assurances will be given as to length of service, however. Transfers will be made on application of the recruit if compatible with needs of the service.

Except in cases of recruits, no transfers of personnel may be made under the new ruling, but must be in accordance with current regulations on transfers.

Corpus Car Plan Wins Citation

System Gets OPA Award, Saves Gasoline

NATB CORPUS CHRISTI—NAVAL AIR TRAINING BASES, CORPUS CHRISTI, has been given a citation by the OPA "for the adoption and efficient operation of an organized transportation plan."

A transportation committee, organized in June 1942, to encourage the "share the ride" campaign, was supplanted in October 1943, by an official rationing board. A cross-file index system was maintained for all drivers and riders and each gas application was checked to determine if full use was being made of the car before coupons were issued to the automobile owner.

OPA DIRECTOR PRESENTS AWARD TO CORPUS

Essex Pilot Has a Close Shave

Last Landing of War Almost a Dunking

One of the oddest personal experience yarns of the war was reported by Lt. Comdr. T. H. Reidy, CO of VBF-83 on the *Essex*. It all happened on the last day of the war.

His squadron was shooting up what Japs it could find around Tokyo when the order came to return to ship because the Japs had surrendered. The pilots had a little fun flying around the sky before coming in for a landing but when it came Reidy's turn to land he could not get his *Corsair's* flaps down.

So that he would not damage the flight deck by a bad landing, he flew around until everyone else had landed and he was the last plane in the air—the last *Essex* plane of the war to make a landing.

He brought the plane in for a normal landing in the arrester gear. The taxi director gave him the signal to taxi forward. Easing the throttle back he waited for the engine to swing up the prop. There was no reaction. It was going slower and slower and finally stopped.

"I guess the airplane knew the war was over," he said.

Fleet Air Reclassification Center

ComFairWestCoast To Operate Activity

A Fleet Air Reclassification Center at San Diego to operate under the cognizance of ComFairWestCoast was established on 15 Sept. 1945. Mission of the activity is to facilitate proper assignment and expeditious movement of officer and enlisted personnel attached to the aeronautical organization through the Fleet Air Commands, by receiving and processing such personnel in order to prepare them for their next duty assignment.

ComFairWestCoast provides the necessary facilities and support in the San Diego area for operation of the Fleet Air Reclassification Center.

Suggestion Program to Continue

Ideas Save 66 Million In First Year

The Navy has announced its beneficial suggestion program for civilian employees will be continued as a peacetime measure. The more than 17,000 ideas adopted in the first year of the program's operation have brought savings of more than $66,000,000 to the Navy, it was estimated.

These suggestions were submitted by workers at Navy yards, air stations, ammunition depots, torpedo stations and various other Navy shore establishments. They ranged all the way from skillfully designed tools, jigs and fixtures used in streamlining production to new and ingenious methods of construction and repair. In addition, several new instruments, which played an important part in tactical operations and training programs, were invented by Navy technicians on their own time.

Alameda Celebrates Anniversary

Aviation Exhibits Highlight The Day

In observance of the thirty-second anniversary of Naval Aviation, NAS ALAMEDA held open house.

Between 60,000 and 75,000 persons visited the station and saw exhibits of all types spread along a three-mile route. Typical exhibits included survival equipment, low-pressure chamber, hospital plane, motorized cutaway engines, A & R shop equipment, overseas packaging by the supply department, a torpedo turning at low speed, the Norden bombsight, all types of bombs, captured Japanese antiaircraft, captured flyable Japanese *Jill, Zeke* and *Nick* planes, approximately 25 different types of Navy planes, including a completely-equipped NATS R5D aerial evacuation plane, aviation training equipment, and a mobile dental clinic.

In addition there was a simulated blimp rescue at sea in the morning and a training exhibition of 32 aircraft in the afternoon.

SHOW ME THE WAY TO GO HOME

Celestial Navigation

1. **To find the Polaris correction you enter the Polaris table with—**
   - ☐ *a*–the local hour angle of Polaris
   - ☐ *b*–the GCT of the sight
   - ☐ *c*–the local hour angle of Aries
2. **LCT differs from GCT by—**
   - ☐ *a*–zone description
   - ☐ *b*–latitude
   - ☐ *c*–longitude
3. **The speed line is the line of position which is—**
   - ☐ *a*–most nearly perpendicular to track
   - ☐ *b*–most nearly parallel to track
   - ☐ *c*–the line which was taken last
4. **The chief navigational star in the Square of Pegasus is—**
   - ☐ *a*–Arcturus
   - ☐ *b*–Alpheratz
   - ☐ *c*–Antares
   - ☐ *d*–Altair

(Answers on page 48)

Credit Is Given For Training

Personnel On Active Duty May Apply

Naval personnel on active duty may apply to civilian educational institutions for high school or college credit for their military training, service experience and off-duty education.

The American Council on Education has evaluated all flight and pre-flight training programs given by the armed services in terms of college credits.

Personnel serving overseas, afloat or in continental United States who desire to have their service training evaluated in terms of college or high school credit should contact their educational services officer or education officer.

Individuals who wish to inform former or prospective employers of their training and experience gained while in service may follow the same procedure.

Navy Transmits Urgent Messages

Personal Communications Now Accepted

The peacetime practice of transmitting urgent personal emergency messages by overseas and shipboard radio circuits to its personnel all over the world was resumed by the Navy on 15 November 1945.

The new ruling permits sending of messages to naval personnel afloat or ashore anywhere in the world. Prior to the 15 November change urgent personal messages could be sent only to personnel afloat or ashore in the Atlantic ocean areas and personnel shore-based in the Pacific ocean area.

Only cost to the men or their families is the telegraph charge to or from the naval radio station that forwards the message to its destination.

Persons in the United States desiring to send such messages may do so by mailing or telegraphing the message to Naval Communications Office, Washington, D.C. for men with a New York FPO address or to the Naval Communications Office, Twelfth Naval District Headquarters, San Francisco, for men with a San Francisco FPO address.

TELEVISION, RADAR AND RADIO USED TO PUT PILOTLESS AIRCRAFT ON SELECTED TARGETS

TELEVISION, radar, VT fuzes and radio all were utilized to give the Navy a series of weird but lethal "ghost" aircraft, most of which were being readied for combat when the Japanese surrendered.

These pilotless aircraft, which were targets or flying bombs, were highly classified while in the development stage in the Special Design Section of BUAER's Engineering Division. But now there are newer versions.

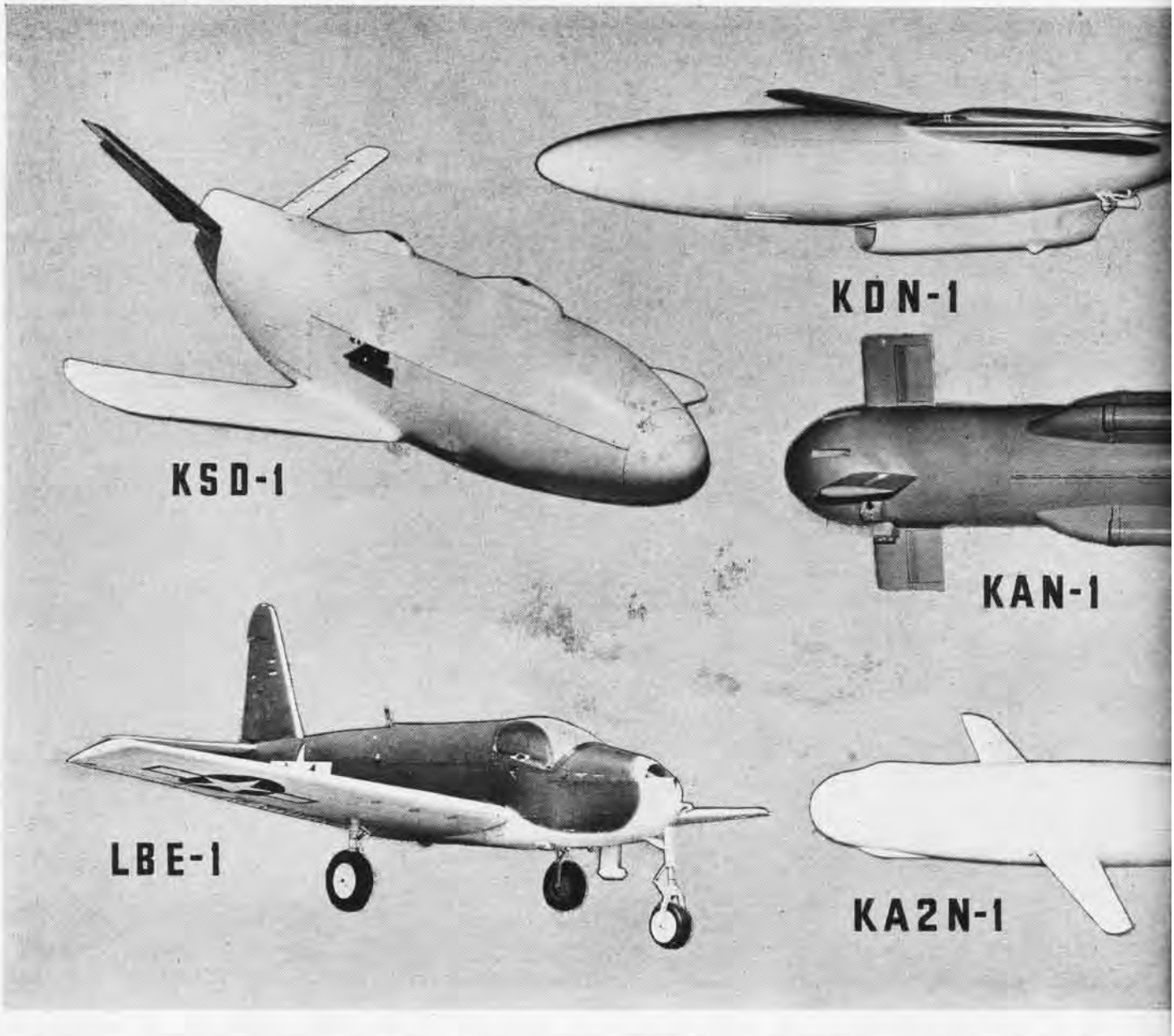
Flying at speeds up to 700 mph, these weapons were given such fantastic and meaningless names as *Little Joe, Gargoyle, Loon, Gorgon, Glomb* or just plain letter-number designations. In addition to these, there were four other radio-controlled or towed-target aircraft discussed in November 1945 NANEWS—the reso-jet KDD-1, the little TDD-3, the TD2C, a pilotless standard plane used for gunnery practice, and the winged target.

Among the newer types which NANEWS now is able to reveal are several which can be guided to their targets by television and radar at high speeds. All are pilotless, being flown by remote control from parent aircraft or distant control, unlike Jap Baka bombs which carried their pilots to death or German weapons from which the pilot was ejected by explosive charge just before crashing.

Most pilotless aircraft now are designated by the letter "K," followed by a letter designating the aircraft's function. The letter "S" indicates craft is for use against a ship target, "G" a ground target and "A" an air target. The letter "D" stands for a drone and "L" for glider. The next letter indicates the manufacturer.

Probably fastest of the Navy's pilotless weapons is the KSD-1. Ten feet long with an 8½ foot wingspan, this flying bomb can be steered by ruddervators toward its target by radio or coincidence sighting on a flare in its tail. Jet propulsion helps push it up to 700 mph. It carries a 1000 lb. GP or SAP bomb.

Another type is the *Glomb*, of which there were five versions. The first two were *Taylorcraft* trainers carrying 375 lb. depth bombs. A third carried 1650 pounds of torpex and the fourth, a high-wing Piper, carried 4000 lb. GP bomb, as did the LBE-1, a low-wing monoplane. *Glombs* are radio-controlled, with television in the nose and a flare in the tail.



NAVY DEVELOPED WEIRD, HIGH-SPEED AERIAL WEAPONS TO USE ON AIR, GROUND TARGETS

ANOTHER vicious looking pilotless weapon is the KA2N-1 developed by Naval Air Modification Unit. This 16-foot flying bomb has an 11-foot wing at the rear, where its 100-lb. shaped charge also is located. It is radio-controlled from a parent plane, has television in its nose for guiding and attains 550 mph. with its 130-second rocket propulsion.

Two pilotless aircraft that resemble conventional planes are the TDR-1 and the TD3R-1. Both models have television in the nose, a 48-foot wingspan and carry a 2000 lb. bomb or torpedo under the fuselage. Their twin engines give 140 mph. Developed as assault drones, they now are in use as target drones.

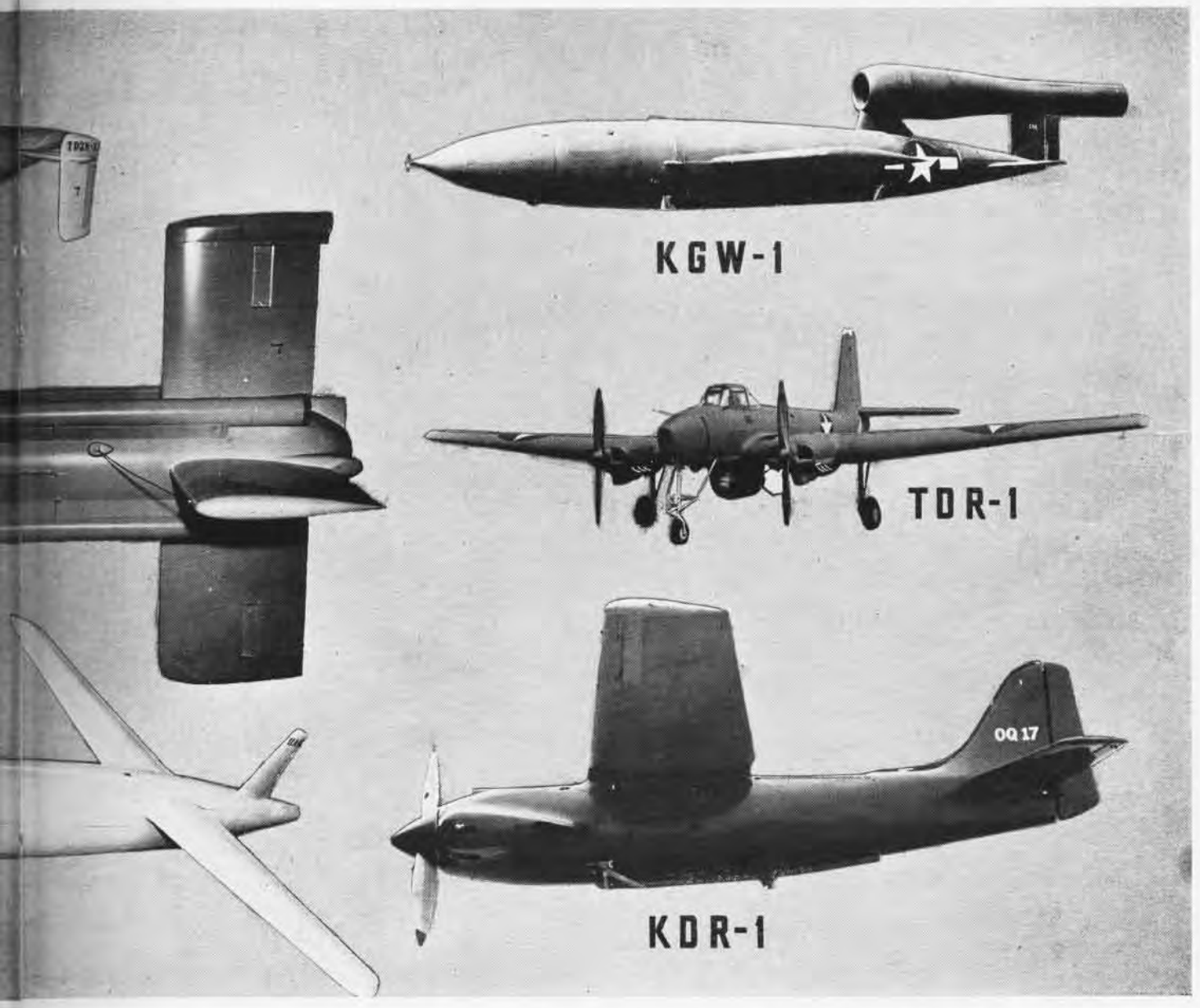
A Navy counter-weapon to use against the Kamikaze or Baka bombs was the KAN-1, another NAMU product. It is a four-winged aircraft shaped like a rocket and propelled both by a standard JATO unit and four standard 3.25" AR rockets. Its armament is a standard 100-lb. bomb mounted in the nose with a VT fuse.

It is fired off 20-foot guide rails installed on a standard 40 mm. gun carriage, using JATO then rocket power to attain its 390 mph. after eight seconds. Operational ceiling is 7000 feet. A gyro keeps it from rolling and radio steers it toward its target. Tail wings are 4¾ feet wide and the weapon is 8½ feet long.

When the German V-1 robot bomb proved an effective though indiscriminate weapon for spreading death, the Army reproduced it exactly. The Navy added radio control and radar for steering and tracking, and designated it the KGW-1. It is being adapted for shipboard catapulting from a 160-foot catapult to attain the 250 mph. necessary for successful launching.

The KGW-1 is 27 feet long and has a 17-foot wingspan. It weighs 5200 lbs., including its 2000-lb. warhead. Fuel is a low grade gasoline. After launching it can be guided toward its target by radio, using a radar installation to give returns to its parent station for tracking purposes.

Two other pilotless aircraft that were developed by the Navy during the war for use as targets in gunnery practice



are the KDR-1 and the KDN-1. The KDR-1 is a streamlined parasol monoplane with 35 hp. engine to drive it 190 mph. It weighs 150 lbs. and has a 10-foot wingspan. It is radio-controlled by a ground operator or parent plane and can do many acrobatics for gunnery use. The KDN-1 is much larger, weighing 981 lbs. Instead of a propeller, it has a 9.5″ turbo jet motor to drive it at 420 mph. It can cruise for two hours and reach 10,000 feet. A throttle permits variable speeds after launching by catapult or from a VPB aircraft. It is the first drone of its weight and size to be recovered by parachute. Because of its speed, the control plane usually is an F7F or F6F. The KDN-1, like slower drones, is recovered by parachute. Because of its speed, it has to be put into a stall before the chute is popped.

The Navy also uses war-weary *Hellcats* for target aircraft, using 10 radio channels in combination to control power, gas tank selection, cowl flaps, oil heaters and other adjustments. It also is experimenting with P-39's, with all electric controls, armor plate to protect instruments from hits and a new automatic pilot to permit greater maneuverability of the plane in the air.

Naval Aircraft Modification Unit developed the radio equipment which handles the ghost *Hellcat*. The Navy plans to convert 100 F6F-3's into drones so it can study pilotless plane problems.

HIGH WING PIPER MONOPLANE, ONE OF 'GLOMB' FAMILY, CARRIES A 4000-POUND BOMB

WORKING FROM COURSE OUTLINES, SUBJECT MATTER SPECIALISTS WRITE TEST QUESTIONS

MULTILITH PROCESS PERMITS USE OF ILLUSTRATIONS AND VARIOUS FORMATS WITH TESTS

CENTRAL EXAMINING BOARD

A HIGHLY important but unobtrusive activity in naval aviation is the Central Examining Board, established in 1942 to provide uniform objective examinations for use in the pilot training program.

The Board, located at NAS PENSACOLA as part of the Staff of the Chief of Naval Air Training Command, approximates an up-to-date business organization. At its head is the O-IN-C whose chief concern is the smooth cooperation of all departments of the Board. The 10 officer assistants were selected because of their specialized qualifications. Some are subject matter specialists who have written textual materials used in the instructional program. Others have had wide experience as test constructors.

Also in the Board's complement are 10 enlisted personnel who operate the multilithing department and 18 civil service employees who assist in the clerical and statistical work.

The objective examination is designed to offer a fair, impersonal and practical basis for applying a common yardstick to all, regardless of the training unit to which the student is assigned. These exams are administered at definite times in each level of training and are scored by specially constructed scoring stencils so that the mood of the instructor or other subjective conditions can play no part in the student's score.

After the examinations have been administered in the field, answer sheets are forwarded to the Board for tabulation and analysis. Examination results are studied and compiled for the benefit of instructors in the field. Strong points as well as weaknesses in student attainment are listed in the reports so that future instruction may be changed as needs require.

THE BOARD'S technique in constructing uniform exams consists of four steps:

The *first* is the preparation of an outline of the actual instructional material used for a given subject at a given level of training. From this outline a list is made of significant ideas and principles as they apply to naval aviation.

The *second step* is the construction of test questions to cover the ideas and principles listed in the outline for the subject. This work is done by a subject matter specialist and is checked for accuracy by other experts in the field. This insures technical accuracy and practicality for any given questions. Questions also are checked for presentation, grammar and clarity of language.

The *third step* is the assembly of acceptable test questions into a complete examination. Attention again must be given to the basic outline of the course to insure a balanced examination.

The *fourth step* is the actual production and distribution of the exam. Questions are vari-typed, mounted, photographed, opaqued and finally printed by the multilith process.

When the examination has been completed, it usually is administered to a subject matter specialist and graded by the scoring gouge. This provides a check for both the examinations and the scoring key. Examinations then are mailed to units in the field and administered according to the CEB's schedule.

DETAILED PLANNING PRECEDES ALL TESTS

[THE CENTRAL EXAMINING BOARD FURNISHES "BEST ANSWERS" SERIES TO NAVAL AVIATION NEWS]

Lt. Comdr. SINKUM

Moral: Visually Clear Take-off Path Immediately Prior To Applying Throttle

Far too many pilots, regardless of number of flying hours, run into something before becoming airborne. Of course, it won't happen to you, you always clear your take-off path just prior to applying throttle. There are numerous reasons for this all important precaution. For instance, there is the pilot who is in a hurry and sneaks ahead of you while you are going over the check-off list, likewise the one who lands and doesn't clear the runway, or the driver of a vehicle that thinks he can cross over before you are ready. In all these cases, and many more, an accident is in the making if you do not visually clear take-off path.

There are hazards in seaplane areas too, the aviation cadet who doesn't know the permanent obstacles in the area; the instructor who is too engrossed in instructing to look where he is going; or the pilot that doesn't realize that it only takes a few seconds for a float plane to cock 10 or 15 degrees while he is making final take-off checks, thereby changing take-off path he had previously sighted.

The prevention of this type accident is taught throughout flight training. ALWAYS REMEMBER, *clear your take-off path immediately prior to applying throttle.* By doing this you will save lives, property, and avoid involvement in a typical case history.

CASE I. An OS2U pilot in his take-off run failed to see a stationary channel buoy in his path. This resulted in the port wing tip float striking the buoy and damaging the float. The pilot immediately cut the engines and he and his passenger proceeded to climb down to the main float as the plane capsized.

CASE II. The flight leader had permission to taxi on the service runway, he stopped partially on service runway about 1500 feet from take-off end. With the flight leader in this position, the pilot, thinking flight leader had taken off, started his take-off run, his plane struck the flight leader's plane, doing severe damage to both planes. The pilot attempted take-off without radio clearance or visual clearance. Board recommended that due to seriousness of this accident it is to be brought to the attention of all pilots and that more thorough briefing be given pilots prior to all flights.

CASE III. This pilot, taking off at gunnery field, failed to make certain that the runway was clear ahead. He misinterpreted warning hand signals by two instructors on the side of the runway and continued his take-off run colliding with plane parked on the runway waiting for installation of a tow target. The pilot avoided a direct collision by kicking hard left rudder and trying to pull the airplane away from the parked plane.

Board recommended that all tow planes take off for tow hops from the head of runway in use. *Pilots use care.*

1 When ground troops hit a defensive snag, the air liaison party attached to the battalion calls by portable radio for aid, giving exact location of enemy spot to hit

2 Message for help is received by the air support command's transmitter, like this one on Iwo Jima, which relays it to amphibious flagship which coordinates strikes

3 Aboard U.S.S. "Auburn" during Iwo Jima action, requests for air strikes go through joint operations room which decides what planes, posted on chart, can do job

4 After joint operations decides what armament and planes can handle task best, assignment is radioed to air coordinator aloft, like this one flying off Okinawa

5 If a bomber is called for, air coordinator sends down one or more to hit enemy concentration. Here a Marine watches close air support plane on Okinawa battlefield

6 Where fighters armed with rockets or napalm will do the job best, air coordinator sends them on mission to hit strong point. "Corsair" rockets blast Okinawa Japs

CLOSE AIR SUPPORT

Policemen of the Air Blast Foe Upon Request of Ground Troops

NATIVES in central Bougainville surrounded a group of Japs and cornered them in a cluster of pill boxes and houses in a clearing. Unable to route them out, they asked a *Corsair* squadron based on nearby Piva airstrip to help clear the neighborhood.

Using red cloth and smoke, the natives marked the area for the pilots to see. The 10 fighter-bombers dropped 18 bombs on the strong point, erasing all but one of 11 huts.

This, in a nutshell, is how close air support works. The theory of supporting ground troops with aircraft is not new, but it reached its highest degree of development in successive amphibious invasions, culminating with Okinawa. In the Okinawa campaign, a fleet of more than 2000 carrier-based aircraft was constantly available a few miles offshore during the entire three-month period.

The Navy and Marines developed close air support and put it to increasing use in the Carolines, Philippines, Iwo Jima and Okinawa. Tactics developed in earlier campaigns at Guadalcanal and Bougainville were polished in succeeding invasions. CVE's furnished support until air strips ashore could be constructed and put into operation.

This is the way typical close air support works: Carrier aircraft make pre-landing strikes on the new beachhead area. Troops come in. They run into cave defenses and hidden artillery. Air liaison parties attached to ground troops use radio to report tough enemy positions to air support control units located on the control ship (AGC).

In this "nerve center" of the invasion is the joint operations room. Here officers decide whether naval gunfire, shore artillery or aerial blasting is the best way to wipe out strong points. Air is decided on. Joint operations decides how many planes and what armament are required and radios the air coordinator aloft. He is in charge of a number of VT and VF aircraft orbiting a few miles from the battlefield. The coordinator assigns the planes, describes the target and tells what weapons to use on it.

It all sounds rather simple, but a lot of coordination and intelligent work is required. If someone along the line gets the position wrong, friendly troops could be hit. The wrong angle of attack could drop stray rockets or bombs on them. Close tab must be kept of planes available and what kind of armament they are carrying.

Planes must be spaced to avoid prop wash and bomb blast, but not so scattered as to let the enemy rally. Dummy runs were found to be effective in holding them under cover until the target could be pinpointed. Close air support is a Grade A morale-booster for friendly troops, who can advance quickly after a strike.

OFF Iwo and Okinawa, Navy and Marine carriers supplied a continuous stream of bombers and fighters, despite the fact that in 10 weeks in the latter campaign eight *Essex*-class and one *Independence*-class carrier were hit by Jap air attacks—the *Bunker Hill, Essex, Enterprise, Franklin, Hancock, Wasp, Intrepid, Yorktown* and *San Jacinto.* Some were repaired in the forward area and kept fighting. Fast CV's augmented the CVE's in Okinawa close support operations to make large number of planes available.

King-pin of the aerial show is CASCU (Commander Air Support, Control Unit), who works through the joint operations room and the senior aviator aloft, the air coordinator. Carriers are often as far as 70 or 80 miles offshore and their support planes circle over water at orbit points.

Ground troops use colored panels or smoke to mark their front lines so that support aircraft can spot friendly troops.

TARGET BRIEFING BEFORE STRIKE IMPROVES ACCURACY OF SUPPORT

COMPREHENSIVE briefing and full use of maps and photographs is the best method of assuring accurate strikes on enemy positions, however. Other marking systems are only aids in target identification. Air strikes are useless unless carried out in a manner that instills confidence between air and ground personnel.

Bombing is best done parallel to front lines, while strafing because of its greater accuracy can be done at right angles if necessary. Bombers allow a yard a pound safety factor for friendly troops, dropping 500 lb. bombs 500 yards from the lines on flat terrain.

Convergence of bullets may put them into friendly lines if a fighter strafes parallel to his own lines. During close bombing at St. Lo by heavy bombers, some missiles fell among Allied troops—shorts or overs from planes bombing perpendicular instead of parallel to lines.

Fighters make good close support planes because of their great accuracy, speed and firepower, although heavy bombers were used in France and even in New Guinea. In jungle country, approach has to be made at a height so the pilot can locate targets by reference to their surroundings, necessitating dive or shallow dive bombing.

So that friendly artillery fire or naval gunfire would not hit support planes, alternate plans were used. Under one no artillery or offshore guns would go into or pass over a certain specified area 2500 yards in diameter. Under the other this fire was restricted to 1100 feet elevation, planes being able to come down to that level safely for their attacks.

TICONDEROGA F6F LOADS ROCKETS TO RAID MANILA

Not all support operations are directed from the AGC offshore. At Iwo and Okinawa, after early invasion phases, the Marines moved in with their control unit ashore in a specially-equipped radio tent. Doctrine laid down by the Navy is used by all planes involved in close support in an invasion, including Marines and Army.

To operate most successfully, the whole air support tactic depends on key men well grounded in their jobs. Air coordinators who run the show in the air must be thoroughly trained and as acquainted with the overall situation as the man who is running the show from ship or shore. A coordinator who can locate and assign targets and coordinate air attacks with ground troop advances is a big aid to CASCU. Marine or Army infantry officers sometimes can fly with him in his plane. Well-versed in topography, use of maps and photographs on the ground and in the air, this team can carry out careful target selection, guide attacking planes into the right area and help bombers correct aim by locating previous bomb hits that were off in range or deflecion.

With one air group in the central Pacific, the coordinator flew overhead with a K-18 camera at 2000 feet, photographing attacks on targets, even to showing the number of the attacking plane. This aided pilots in correcting high pullouts or wide misses and by damage assessment, made possible recognition of good work, a morale booster.

ONE Marine fighter pilot carried an Army major commanding guerrillas in a Philippines area in his *Corsair*. He sat on the major's lap while they strafed Jap positions pointed out by the guerilla leader.

Both radio and flight discipline are highly important in close air support operations. Pilots must make their dives on targets as directed by CASCU. At Okinawa two pilots were lost because they attacked from the wrong direction. They were hit while flying low over enemy territory, headed away from our lines, which they could have reached if they had attacked from the other way.

Because of heavy radio traffic during an invasion, the need for strict radio discipline by pilots is easy to understand. Occasionally English-speaking Japs would break in to shout "Don't bomb here—friendly forces." Good communications are vital so that the air coordinator can get his orders correctly from the ground troops, through joint operations, and deliver the right planes armed correctly for the job at the right time.

Close support aviation is an additional weapon available for ground commanders, to hit places where artillery and naval guns will not reach because of distance or terrain. It is the most flexible, and swift acting artillery known to modern warfare. Development of aircraft rockets and napalm bombs added greatly to the striking power of sup-

port planes. Rockets enabled them to pour heavy firepower into pinpoint targets while the jelled gasoline enabled them to penetrate nooks and crannies that conventional armament could not reach.

The idea for support air was worked out by the Navy during the war, although the Marines early in 1941 had experimented with the idea. This was the first war when amphibious invasion was developed to a high degree of perfection. The Navy gives its pilots training in close air support early in their cadet days. Photo interpretation, map reading and pinpoint navigation are all essentials of the technique.

WHEN they reach fleet air commands they are given more realistic training. Simulated pillboxes and enemy installations are used for strafing and bombing. In the past the Army has cooperated in some cases by providing troops so that close support problems could be worked out.

One training range, for instance, near Pasco, Wash., covers 45 square miles of desert land, rugged and varied in elevations. Strike planes rendezvous at two initial points indicated on the pilots' grid maps as IP Able and IP Baker. Range directors in the control tower control selection of targets to be used, direction of attack, and ammunition to be expended. Pilots locate targets on maps and attack.

1 Two TBF's hover over landing craft boring in for amphibious landing on Makin, waiting a call

2 "Corsair" gives close support to Marines on Peleliu, dropping its bomb on holed up Japs

3 Rocket-laden "Corsairs" prepare to take off to strike enemy; rockets can pinpoint a target

4 Marine "Corsair" pulls up after dropping fire bomb on Japs' position in Southern Okinawa

5 Pilots in fleet training practice close air support doctrine against dummy pillbox on Pasco range

6 Amphibious force flagships like "Ancon" were nerve centers where joint operations HQ located

AVIATION ORDNANCE

INQUIRIES SHOULD BE ADDRESSED TO THE CHIEF OF BUREAU OF ORDNANCE

SB2C Boresight Fixture Modification

The Mk 8 fixed gun sight for SB2C-type aircraft is mounted on a quick detachable bracket for ease in removing for landings and take-offs. This procedure necessitates frequent handling of sights, sometimes causing them to shift in their brackets, thus throwing the plane out of boresight. Operating schedules sometimes make frequent boresighting of planes impracticable.

In order to provide a means by which a quick boresight check could be made before sending a plane out on gunnery and bombing hops, ordnancemen attached to NAAS CECIL FIELD, modified the standard boresighting fixture for the SB2C type plane.

This modification was accomplished by capsizing the check sight on the boresighting fixture and lengthening the adjusting rods. This made it possible for the man checking the fixed gun sight to peer through the check sight. This procedure makes it fairly simple for the checker to

BORESIGHT FIXTURE INSTALLED IN SB2C

adjust the Mk 8 sight, aligning it with the check sight–pipper to pipper. The accompanying photograph indicates the manner in which the change was made, also its practical application.

This temporary method of boresighting saves considerable time, allowing a plane to be checked wherever it may be parked without use of a boresight template. This method, however, does not eliminate the need for periodical boresighting using standard boresight template.

Near Fatal Accident With Tow Target

A considerable number of accidents involving tow targets have been reported to BUORD. One of the more recent occurred during a gunnery run on a banner-type target. In this accident, the pilot shot away the tow line while making a diving run from 9000 feet. The counterweight crashed into the airplane smashing the windshield. The pilot received numerous lacerations of the face and narrowly avoided crashing into the water.

Various remedies have been suggested. One Navy activity recommends a bridle 50 feet long to be supplied with the A-10 and similar targets. This, it was felt, would provide a greater margin of safety

F6F DAMAGED BY TARGET COUNTERWEIGHT

in the event a pilot overled the target. Other activities are using a dual tow line for 100 feet forward of the banner.

Army accident investigating committees and boards recommended "that lead straps be 25 feet rather than only 12 feet in length in order to decrease the possibility of shooting off connecting devices."

The Army has issued Technical Order 28-10A-13 directing that 100 feet of towing cable be replaced by 1¾ inch webbing to decrease damage from the cable. BUORD has had a project set up for study and testing of the banner-type target, in which targets with 50-foot bridle lines are being investigated.

New Set Tests Electrical Equipment

Aviation ordnancemen who test bombsights, SBAE, bomb racks and shackles, cameras and intervalometers may be interested in the test sets constructed and used by Gunner Ezra W. Stevens, USN.

Two sets were built, a small one to use

TEST UNIT OPERATES ON 26-VOLT CIRCUIT

with the MK 15 MOD 5 and 7 Norden Bombsight and with the MK 1 MOD 1 SBAE, and a large set that tests several different items including the above named ones.

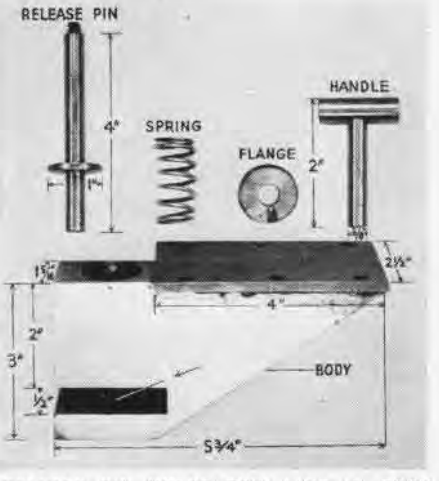
The large set is described as "Test Set for MK 15 MOD 5 and 7 Bombsight, MK 1 MOD 1 SBAE, Bomb Racks, Shackles, Cameras, Intervalometers, Continuity Test." It is to be used on 26-volt circuits to operate, test or demonstrate only one piece of equipment at a time.

With suitable leads, a given piece of equipment can be readily connected and its circuits tested or a bench operational check can be run for proving purposes. The set also will serve to demonstrate the various types of equipment for which it was designed.

BUORD will not furnish these test sets, but will supply wiring diagrams to interested activities who may desire to build either set.

Ordnanceman Designs Target Release

From CASU 50 comes a suggestion for a tow target release for TBF-TBM type aircraft which has been tested by this unit and proved to be satisfactory. This release, designed by Coward, AOM1c of CASU 50, is sturdy, can be easily constructed by interested activities, and has several addi-



RELEASE PIN HOLDS TOW LINE IN BODY

tional advantages over the standard tow target release as presently designed.

Five parts make up the tow target release *(see cut)*. The release pin fits into the body and is held down by compression of the spring. The flange is threaded and is locked in the body by a set screw. The handle also is threaded and screws on the release pin, permitting disassembly and facilitating installation.

When the release is properly assembled, the release pin extends approximately ½" into the bottom of the body, forming a secure lock for the tow line. Six bolts and a reinforcing plate secure the tow target release to a section of the fuselage so that the handle for releasing the tow line will be located in the bomb bay just forward of the bomb bay window on the center brace of the bilge at station No. 170.

This method of mounting the tow target release on TBF-TBM type airplanes has been approved by the Bureaus concerned.

Maintenance

AMM'S ON HANGAR DECK OF LEXINGTON BLEED AN F6F BRAKE; IT TAKES TRAINED TECHNICIANS TO KEEP PLANES IN THE AIR

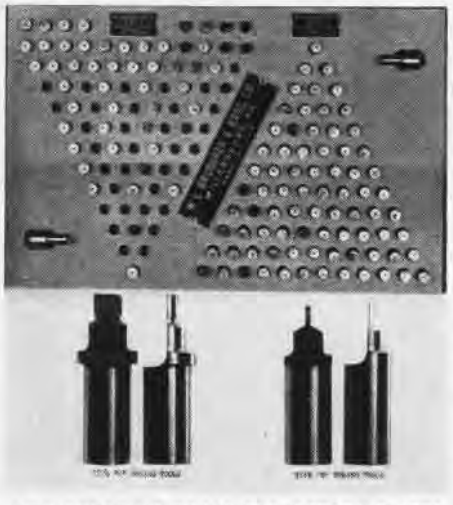
Fuel Metering Jet Boring Tools

Overhaul activities soon will be supplied with equipment for reboring and resizing the fuel metering jets used in aircraft carburetors.

Design of the boring tools, developed by BuAer, eliminates undesirable features of the ordinary twist drill and machine reamer. Provisions are made for boring the approach, the approach angle and the jet throat in one operation, thereby maintaining accuracy of alignment between these parts of the jet and assuring consistency in manufacture and performance. All burrs formed during the boring process are removed without any additional finishing or polishing. High speed steel is used in all tools, and resharpening will not be required except after long periods of use. When this is necessary, reconditioning can be done without specialized grinding equipment.

Experience has shown that when the new boring tools are used with any appropriate bench or toolmaker's lathe equipped with either a one-half inch or a one inch draw collet, jets flowing within the present accepted tolerances of plus or minus one per cent can be produced.

Each set of tools is made up of two groups, one for boring type "B" jets (Bendix-Stromberg Part No. P-10455), and another for type "C" jets (Bendix-Stromberg Part No. P-22244). A tool is provided for boring any size of either type now used or contemplated by the Navy. Each tool in the type "B" group has a drill size plainly indicated on the shank, and each size of the type "C" group is similarly marked in terms of flow (cubic centimeters per minute). These size designations are identical with those found in all Bendix-Stromberg manuals. A special holder for each type jet, for use during the boring operation, also is provided with each set.



NEW REBORING TOOLS FOR METERING JETS

Production of the jet boring equipment now is under way, and it is anticipated that all major overhaul activities will be allocated at least one set of tools. In the future it will not be necessary to requisition jets already bored. ASO will carry only blank jets in stock.

Leaking Shut-Off Cocks on R5D

VR-4 reports that a high percentage of shut-off cocks on all R5D aircraft equipped with fuselage fuel systems have leaked persistently after being operated a small number of times, causing a serious fire hazard in the fuselage fuel compartment. The only satisfactory correction has been replacement of the Lunkenheimer shut-off cock 765-1 (NAF 26837-1) (R45-C-2275) with a Parker valve (702-FG-4D) (R45-V-23). Further investigation by VR-4 showed that the Lunkerheimer shut-off cock is described in the ASO Catalog as being suitable for water and oil only.

This has been brought to the attention of ASO with a request that in the future they supply the Parker valves instead of Lukenheimer for R5D aircraft.

TBF/TBM Heater Installation

Because of the unavailability of needed material for TBM Changes 233 and 236, it will be necessary to cancel these changes. In place of the production installation system of the surface combustion heater that was modified by Change 233 and where no heater system was installed in production (see Change 236), NAS Norfolk has devised a very satisfactory system. It will be incorporated only in those airplanes destined for cold weather operations.

NAS Norfolk TBF/TBM Airplane Local Change No. 19 of 23 October 1945 describes the installation of a Stewart Warner 906A 50,000 BTU heater in the TBF/TBM airplane. This provides an adequate heating and ventilating system for this type airplane, including heating and windshield defogging.

NAS Norfolk will fabricate a quantity of kits required to incorporate this change, and the TBF/TBM reconditioning centers and any other activities designated by BuAer will incorporate it in the designated planes.

A&R's Cooperate on Prop RUDM's

A&R shops can help BuAer by following up "cause unknown" RUDM's submitted by an operating activity that is unable to determine the reason for an engine failure.

An example is the commendable performance of the propeller shop at NAS QUONSET POINT. For the past few months they have followed up each "cause unknown" propeller RUDM with a letter to BuAer and a copy to the activity submitting the trouble report. The letters outline the findings of the propeller shop during overhaul of the unit. This system helps operating activities improve their maintenance and permits BuAer to take action on many RUDM's that otherwise would remain "on ice."

Longer Batten Secures Rudders

FAW-4—Commenting on a NAVAL AVIATION NEWS, 1 July 1945, report of a PB4Y-2 rudder failure caused by parking the aircraft in strong, gusty winds with inadequate rudder battens, FAW-4 describes a new type batten they designed to prevent such trouble.

The standard type rudder batten used on PB4Y-2 aircraft is small and puts the entire strain on the bottom rib in the rudder. In a wind of high velocity there is likelihood of shearing the rivets in the collar that secures the rudder rib to rudder torque tube. The new batten distributes the stresses throughout the six rudder ribs instead of transmitting all stresses to the bottom rib only.

The A&R, Attu, has manufactured 27 sets of these battens, that are being used successfully on PB4Y-2 aircraft.

▶ ***BuAer Comment*—Battens are a positive method for locking the surfaces even though an internal locking device is installed on the PB4Y-2. Also, in high, gusty winds this batten will take the load off the locking device.**

LONGER RUDDER BATTEN RELIEVES STRESS

(DESIGNED BY LT. FRANK C. SPRATZER, USNR)

Check on Carburetor Air Leaks

General Engine Bulletin No. 85 is being issued to cover checking of the air section of the Stromberg Injection Carburetor for leakage. In the past there has been no general procedure for such checking. Distribution was expected to begin about December 15.

Cost Accounting Works in A&R's

A definite workable Cost Accounting Program for A&R departments has been developed after months of study and planning by a joint BuAer and BuSandA board. The plan, taking shape in the officially approved *Assembly and Repair Department Man Hour Accounting Manual*, is being installed in all major air stations, four of which already have the system in complete operation.

NAS Pensacola served as the guinea pig for experimentation, the proposed program being introduced there first on a trial run basis. At a conference held in Pensacola, representatives of major A&R departments received instructions in the establishment and operation of the cost accounting system and had an opportunity to observe the tentative plan actually in operation at a naval air station.

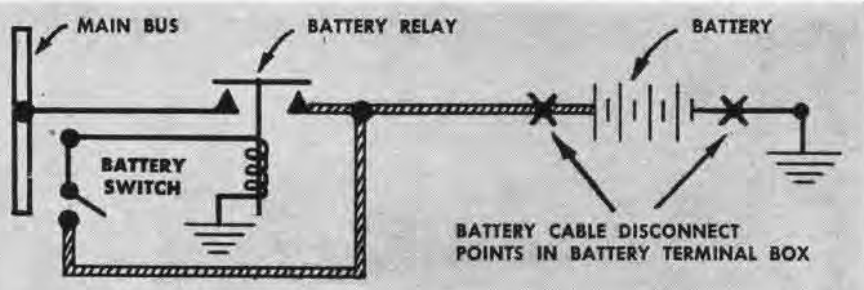
In its final form the system provides for the establishment of accounts for receiving direct charges or accumulating time expended by A&R department personnel on aircraft and aircraft items by model, type, and class. It also includes provision for collecting man hours expended on a specific item or lot of items repaired or overhauled, and, in addition, it affords a means of obtaining man hours expended on specific operations or phases of work performed in specific shops or divisions of an A&R department.

Adoption of a standard labor distribution card adaptable to mechanical tublating machine methods of compiling data has insured efficiency of operation and uniform procedure, plus considerable flexibility in amount and variety of cost data that may be obtained economically and feasibly.

The plan is so established that material accounting will soon be combined with man hour accounting to form a true cost accounting program. As operating at present, it furnishes data of considerable value both to the local A&R Officer and to the Bureau of Aeronautics. Planning, scheduling, and production control in the local A&R are greatly facilitated as a result of the man hour information furnished by the system. Likewise BuAer is obtaining information useful in preparing budget estimates and in making valuable production analyses for additional study.

A & R Shops

Let NANews Hear From You!



The following is quoted from an Aircraft Accident Report: "The mechanic had just completed replacing the battery and was removing the cable from the battery relay for replacement when the wrench he was using was knocked from his hands by a sudden and violent outburst of fire and sparks. Immediately there was a large flash that covered the complete compartment and everything in the compartment started to burn. . . . The aircraft was considered damaged beyond possible repair and permits only a partial salvage."

POWER HAS PUNCH

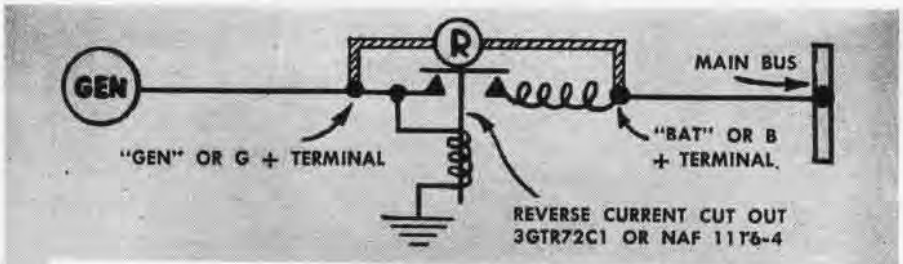
▸ **BuAer Comment:** Whenever an electrical circuit is being worked on, *power* to that circuit should be turned *OFF*. In some cases—the battery relay circuit is one—turning the switch *OFF* will *not* turn off power on every cable. Turning *OFF* the battery switch still leaves an "always-hot cable" running up to the relay from the battery. The only way to "kill" this circuit is to disconnect the cable at the battery. That's what the mechanic in the subject AAR should have done before working on the far end of the cable.

Another such case is encountered when working on a circuit breaker fed from the bus. Usually the circuit breaker is located between the bus and the load control switch. If the battery is switched *ON* the circuit breaker is "hot" regardless of the position of the *load control switch*, and the power to the circuit breaker can be cut off only by turning the battery switch *OFF*.

On one station, a mechanic working on the battery relay did disconnect the battery but forgot to disconnect an external power source which had been used. Result: One damaged plane.

▸ **Generator Failure Indicator.** When the DC generating system of an airplane ceases to deliver power to the bus, the aircraft batteries may "run down" before the pilot detects failure by observing voltmeter or ammeter. Since aircraft batteries do not have sufficient capacity to operate electrical and electronic equipment for long, the pilot must detect the failure as soon as possible and turn off all electrical loads not absolutely essential for bringing the airplane home.

Parts required for the indicator installation, with spec. and stock numbers are: indicator light housing, AN3029-16, R17-H-8405; cover assembly (red), AN-3029-12, R17-C-41834; lamp, AN3121-313, R17-L-6882; wire, AN-20, AN-J-C-48, R15-C-2000.



To notify the pilot quickly of generator failure, a special warning light has been devised by Marine Service Squadron 41. A red indicator light, connected so that it glows whenever the generator has failed, is installed within the pilot's range of vision and is connected across the reverse-current cutout; that is, to the "BAT" and "GEN" terminals of the GE 3GTR72C1 cutout, or the "G" and "B" terminals of the NAF 1116-4 cutout.

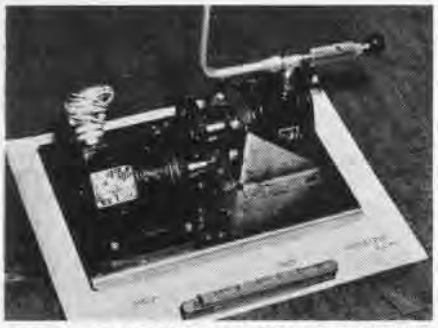
PBY-5A Brake Unit Pressurized

FAW-4—Because water seals in the brake housings on PBY-5A aircraft have not maintained sufficient watertightness, personnel attached to this wing designed and built a new unit that seems to combat the problem successfully.

The pressurizing unit consists of a PBY-5A electric windshield wiper motor geared to a PESCO vacuum pump off an OS2U. This pump develops pressure that is directed to the brake housing through two brake vent lines. Pressure is maintained at a desired 6"-7"Hg. by means of a spring type regulator.

For a plane in the water, wheels extended, the pump maintains a maximum pressure of 4½"-5"Hg. Consequently the total maximum pressure of 7"Hg. is more than enough to prevent leakage.

The engineer has complete control of the unit from his station in the tower, which houses the power switch, pressure gauge and regulator valve.



PBY-5A BRAKE PUMP AIDS WATERTIGHTNESS

The complete installation weighs 12 pounds and has proved successful.

[Designed by Ens. R. G. Bartenstein USNR]
[Built by Irving F. Simmons AM2c USNR]

▶ *BuAer Comment*—A similar idea was originated by the RCAF. BuAer initiated a test project at HEDRON 6 to test a pressurizing system after that squadron had reported leakage troubles at the same section. Results after the test indicated that the pressurizing of the main wheel brakes considerably increased the service life of the brake discs and decreased maintenance. A change request was initiated to install a brake pressurizing system in the production of PBY-6A airplanes. However, the change was never put into effect due to termination of the contract.

Brake Test And Pressure Unit

VR-10—An ACMM(T) assigned duty with this NATS squadron has developed a new system for the testing and pressure setting of brakes. With it all four of the brakes can be bled at the same time and in a more efficient manner. Power brake settings can be made on either of the four brake assemblies and checked against each other for accuracy. Under the old set-up only one assembly could be tested at a time.

Whereas hydraulic fluid bled from brakes under the old arrangements was always given up for lost, the new system saves this fluid for further use when needed.

The new testing apparatus provides an extension of the pressure gauge to the power brake valve. This will eliminate one man in making these settings. The old method of brake testing required the services of three men for six hours. This meant an 18 man-hour time period. The present method uses only two men for four hours or a total of eight man-hours. All necessary operations used in the testing of brakes and in the installation of a power brake valve can also be accomplished on one hook-up of the test set.

BRAKE TESTING EASED WITH NEW SYSTEM

The device appears to be especially suited to trouble shooting on brakes and deboosters.

[Developed by Fay F. Christensen, ACMM(T)]

Rivet Hole Marking Is Speeded

NAS Pensacola—An idea developed here promises to eliminate the tedious practice of marking new rivet holes with scribe and dividers. This old practice was open to spacing errors that often showed up too late.

With the new method, steel balls slightly oversized are placed in old rivet holes and the new piece to be drilled is tied in tightly over this setup. The new piece then is tapped lightly with a soft hammer above the location of each ball. The small indentations thus left are center punched and drilled to proper size.

In practice this method has proved vastly superior to the old method and an estimated annual saving of $600 is reported by the originating activity. The system was developed under the Navy Employee's Suggestion Program.

[Designed by William H. Harrington]

CENTER RIVET HOLE WITH STEEL BALLS

Mock-Up Simplifies Instruction

A simple mock-up designed and built at the NAVAL AIR TECHNICAL TRAINING CENTER, 87TH & ANTHONY, CHICAGO, has eliminated one of the greatest difficulties in teaching students how to make accurate tests of propeller governors in field service.

In order to accommodate the many types of governors and related accessories in use today, test rigs must incorporate many hydraulic and electrical outlets as well as instruments for computing and indicating results. As a result, test rigs are highly complicated and sometimes baffle the new student.

To offset this teaching handicap, a chief specialist in the propeller school constructed a mock-up of wood, scrap tubing and surveyed governor parts. Various units of the test rig are simulated in the mock-up. Governor and differential pressure cutout switch are cut away to show interior parts and oil passages. Oil lines are so laid out that oil flow for any given test can be traced visually from source to return line. The transfer valve can be moved to the feathering position and flyweights can be moved to indicate under-speed, on-speed or over-speed conditions of the governors.

MOCK-UP AIDS IN PROP GOVERNOR TESTS

The mock-up has greatly simplified this phase of instruction.

[Designed by Harry R. Crook, SCP(T) USNR]

Overhaul Wants Engines Intact

Aviation Circular Letter 115-45, 4 October 1945, *Disposition of Aircraft Engines Awaiting Overhaul* has been issued to correct the prevalent situation of engines coming to overhaul activities with parts or accessories missing. The ACL lists the following parts and accessories that are to be turned in with each engine:

Supercharger regulators, carburetors, carburetor adapters, carburetor attaching bolts, carburetor screens, electric primers, fuel feed pipes, fuel feed bolts, fuel pumps (engine driven), ignition harness, magnetos, magneto pressuring equipment, oil pumps, spark plugs (complete set), water regulators, engine water injection equipment (including attaching parts), complete log books, and deflectors (complete set).

The letter directs that "if for any reason activities turning in engines for

overhaul cannot furnish any of the above items or any other component parts applicable to the engine in question, the commanding officer shall submit a statement, listing the missing items with an explanation of the shortage, to BuAer. Two copies of this statement shall be forwarded with the log book and one shall be submitted to the appropriate area command."

The overhaul activity will verify the statement of parts shortages and submit a copy to ASO, also notifying ASO and BuAer of any discrepancies.

All engines being turned in or shipped for overhaul shall be preserved in accordance with *General Engine Bulletin No. 38* and its revisions.

Activities issuing overhauled or reconditioned engines will furnish them complete with all accessories listed above, wherever applicable to type and model in question, and all other necessary parts and components as may be required to make the engine a complete, usable power plant.

New Tool Speeds Magneto Timing

VMF 311—A special magneto timing tool has been designed for positive-quick timing of Bosch DF 18 RU and LU magnetos to the engine by locking rotor in correct timing position during the installation.

The tool may be made of any metal preferably stainless steel .081 thick. One edge of tool is curved, the arc being the same radius as magneto housing. The cord of arc is a straight edge so located as to lay across the flats of cam timing collar and intersects arc at the timing mark for (E) gap on housing. Two slotted holes are so located that the tool may be secured to housing at the cover stud holes.

When magneto is to be timed to the engine, it is brought to the correct timing position and locked there by placing the straight edge of the cam timing collar and on timing mark for (E) gap on the magneto housing. The tool is secured in housing with regular cover plate screws, thus locking the magneto in the correct timing position while it is installed on engine. After installation is completed, the tool is removed.

[Designed by Corp. Francis J. Huserek, USMC]

LEATHERNECK DESIGNED THIS STEEL TOOL

SUPPLY NEWS
FROM ASO AND SUPPLY DIVISION BUAER

Stocking Bow Gun Mount Spares

Ryan twin 30 cal. bow gun mounts now are standard GFE equipment on all PBY-PB2B aircraft, and small quantities of assemblies still are available as replacements for original single 30 cal. revolving circular windshield installations. Some activities, however, continue to report spare parts for these mounts incorrectly. All records on these mounts should be reviewed and corrections made where necessary in accordance with the following data:

Identification of the mount parts is not difficult, as they are exclusively in Ryan 16000 number series and are preceded by the letters "PB." Their correct stock classification is R82-RYA plus the full part number, i.e., "PB16013 Dome Assembly," not "16013 Dome Assembly." Correct stock number, therefore, is R82-RYA-PB16013.

The following Ryan part numbers are completely interchangeable with the Consolidated Vultee part numbers indicated, and all Ryan stocks of these parts should be carried and reported as Consolidated Vultee parts:

RYAN P/N	NOMENCLATURE	CORRECT STOCK NO. R82-CAC
PB16161	Spring	28B1323
PB16180	Ring	28B4051-2
PB16186	Shaft Ass'y	28B1321
PB16204	Flange	28B1308-3
PB16205	Flange, Mech.	28B1308-2
PB16C205	Flange, Cast.	28B1308-1
PB16237	Gasket	28B4042

This information as well as full details on all procured items was included in ASO S/L D12775/CA10-E of 12 April 1945 to all cognizant activities. Extra copies are available upon request.

PBY Twin 30 Cal. Bow Gun Enclosure Model PB16000 Microfilm Reel and Index (undated) and *Handbook of Instructions with Parts Catalog An--11-1-71* of 15 December 1944 (Revised 15 February 1945) also have been available for some time and should prove beneficial to all.

Droppable Fuel Tanks Identified

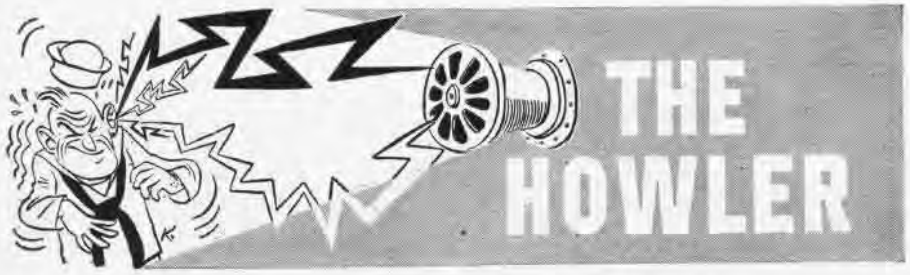
The correct identification and application of external droppable fuel tanks for carrier type aircraft is given in the table below. Activities should assess their stock and adjust their records accordingly.

Mark No. (F6F)	Stock No.	Mfg. No.	Gal.	Type	Remarks
2	81-T-739935	GR-28350	150	Center	Not to be used when chg 83 is in plane.
5 Mod 1	81-T-741175	YngstnSt 1 Dr 7280	150	Universal	Used with chg 83.
4	81-T-739990	AmSTCo 7-2	100	Wing	
4	81-T-ALU-44031-E	ALU 44016-E or 44031-E	100	Wing	Interchangeable with Steel Tank.
(F4U)					
3	81-T-739950		160	Center	Listed in Fleet List as 81-T-714930 for -1 & -1D.
5	81-T-741175	YngstnStlDr 7280	150	Univ (side)	For -4 model.

Note: The use of Mk6 (Army type P-38) tanks of F4U airplanes is no longer authorized according to BuAer confidential dispatch 261707 June.

(TBM)					
1	81-T-730100	AmStCo 1356	58	Wing	For -1 & -1c mod.
4	81-T-739990	AmStCo 7-2	100	Wing	For -3 mod.
4	81-T-ALU-44031-E	ALU-44016-E or 44031-E	100	Wing	Interchangeable with Steel Tank.
(SB2C)					
1	81-T-730100	AmStCo 1356	58	Wing	For all models, with Mk 51 Bomb Rack.
4	81-T-739990	AmStCo 7-2	100	Wing	
4	81-T-ALU-44031-E	ALU-44016-E or 44031-E	100	Wing	Interchangeable with Steel Tank.

BuAer T.N. 29-45 established the mark system of identification in order that each of the various tanks might be clearly and simply identified. ASO, in Accessories Technical Supply Bulletin No. 26, gave the correct stock numbers to match the mark numbers. These stock numbers, as listed above, cover all expendables as well as the tank itself and should be used when placing orders. Only when the tank alone is being ordered should the manufacturer's number in combination with R81—be used. "Mod numbers" will be added to the existing mark numbers as minor modifications are incorporated in the tanks, and care should be used to insure that records are kept up to date.



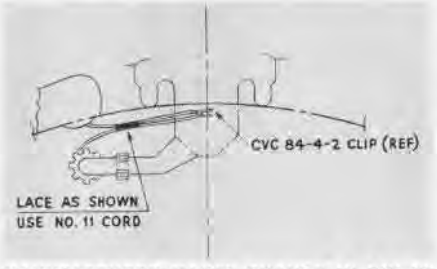
No Extra Gaskets Under Plugs. A recent engine manufacturer's representative report states in part, "In order to prevent spark plug seizures and subsequent breakages on removal, the CASU that is maintaining this plane has been installing two gaskets under all spark plugs."

BuAer's Maintenance Division warns against this practice. In addition to affording a gas tight seal between the spark plug shell flange and the cylinder bushing, the copper spark plug gasket has a definite effect on heat characteristics of the plug. Since heat dissipation is one important function of the copper gasket and the heat rating of a spark plug has a definite bearing on performance of the plug, use of more than one gasket alters heat characteristics of the plug and affects its function in the engine.

Exposing cylinder bushing threads, when two gaskets are used under spark plugs, is conducive to pre-ignition and/or detonation, and under the right combination of conditions, is a dangerous practice. Cylinder bushing threads exposed to combustion flame and gas in a short time will become pitted, corroded, and, in general, unsatisfactory for installation of a spark plug with only one cylinder gasket.

All activities are referred to TO 57-45, page 7, the last sentence of which states: "Check to ascertain that only *one* copper gasket is installed on the plug. Where the thermocouple gasket is used, a regular gasket will *not* be used."

Securing Mk 8 Gunsight Electrical Lead. Acting on a trouble report that the Mk 8 gunsight electrical lead obstructs instrument view on the F4U-4, the manufacturer has incorporated a production change on planes of this type as of 24 October. The extreme length of the lead was responsible

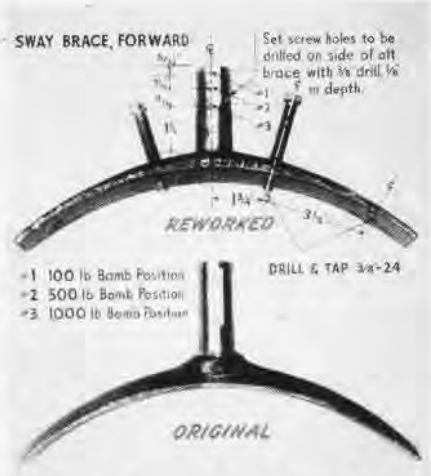


MANUFACTURER MAKES CHANGE IN F4U-4'S

for the difficulty complained of by pilots. The change consists of securing the lead as shown in the accompanying sketch correcting Chance-Vought Drawings Nos. VS44874, VS40431. This modification affects F4U-4 aircraft Bureau Nos. 97261, 97263, 97265, 97266, 97268, to 97274 and subsequent planes, and should correct the difficulty.

Losing Drop Tank Sway Braces. An RUDM from CASD-13, MASG-51 reports that drop tank sway braces, P/N 28687, on F6F-5 aircraft have been coming loose and falling, causing minor damage to fuselage and horizontal stabilizers.

The activity reporting the trouble has worked out a local fix (*see cut*). Set



LOCAL FIX SECURES F6F-5 SWAY BRACES

screw indentation drilled in the shank prevent the screw from working loose with vibration. Armaments Branch, BuAer Engineering Division is making a study of sway braces.

Hydraulic Reservoir Dip-Sticks Melting. The plastic dip-stick, VS-48959, used to measure fluid level on the hydraulic reservoir of the F4U-4 aircraft has deteriorated or "melted" in a number of instances, probably as a result of high operating temperatures. This has necessitated the breakdown and cleaning of the entire hydraulic system. Aluminum alloy measuring rods with a black anodic finish for legibility now are being installed on production aircraft. For aircraft now in use, *F4U-F3A-F6 Aircraft Bulletin No. 250*, 18 October 1945, outlines information necessary to fabricate metal replacement dip-sticks at field activities.

Get the Idle Mixture Right. Too many A&R's involving power plant malfunctioning contain the familiar phrase, "loss of power on take-off." To determine and correct the basic trouble causing such accidents, BuAer has been following this type of report very closely. Numerous tear-down reports have been requested from overhaul activities, but, in general, these reports sum up to "no mechanical discrepancies found within the engine or its accessories." Sometimes it isn't necessary to request a tear-down report, since the reporting activity has put the plane back in commission with as little as a plug change plus some minor structural repairs.

It all seems to revert to TO 80-44: *Checking Idle Mixture.* Checking the idle mixture is the responsibility of maintenance personnel as well as flight personnel. Don't dismiss it as the other fellow's responsibility. If it isn't right, hop out, open up the cowl and get it right. It takes only a few minutes if you're in the habit of making this adjustment. Read TO 80-44.

Don't be too conservative with power output during magneto check. High power outputs are desirable in checking magnetos and may be used under favorable conditions.

Attention Ground Crews. When planes get bruised and battered while supposedly they're being tenderly cared for by ground crew personnel, pilots and trouble boards have a right to howl. Too many AAR's tell of crumpled wings and damaged props resulting directly from careless handling of planes by ground crews.

A typical case is that of the FM-2 which surprised the plane captain by taxiing into another aircraft parked nearby. He shouldn't have been surprised; he was in the cockpit at the time, checking the instruments. The chocks slipped out of place (were they set correctly?); the plane began to roll (maybe that engine was revved up too high); the instrument checking continued (Brother, you can't taxi on instruments!); and so the two planes met. Time out—plenty of time out—for repairs on wings and propeller.

Another similar report states that a

plane captain turned an aircraft up to full power and it jumped the chocks, smashing into two parked planes with major damage

to all aircraft involved. Grounding three planes at once is quite a score for reverse maintenance.

Careless taxiing by crewmen causes most of the ground accidents. Fast taxiing, failure to watch both wing tips, and misjudging of taxiing space are chief complaints. The preventive measures are obvious. Take it slow, be sure there's room.

SERVICE Test
INTERIM REPORT DIGEST

TBY-2 (392 Hours' Test)

Safetying High Tension Lead Coupling Nut. Nut was safetied in accordance with P & W R-2800 Engine Bulletin No. 203. The rubber grommet fell across the output of the secondary condenser, causing an air gap to occur in high tension circuit. This was sufficient to prevent magneto output. *Recommend* extreme care in insertion of high tension leads to the magneto.

Bendix Scintilla Magneto. Spring contact on the magneto end of the high tension lead No. 85-184B from left distributor to the magneto came loose when inserted into magneto. Loose spring shorted out left bank of magneto. High tension lead was being modified in accordance with P & W R2800 Engine Bulletin No. 203 when the spring broke. Lead is hard to insert into magneto while distributor and magneto are mounted.

Brakes. The .100 brake disc installation was removed, as brakes were worn beyond safe operating limits. Brakes averaged 12 landings between adjustments and 30 landings between changes.

F8F-1 (398 Hours' Test)

Actuating Cylinders Scored. Investigation of another case of failure of one landing gear to retract showed both landing gear and both wheel door actuating cylinders to be badly scored. All piston seals were damaged enough to cause internal leakage. Cylinders had been replaced previously for same reason. New cylinders had only 62 hours when trouble occurred. *Recommend* again that cylinders be redesigned.

Protected Air Valve Assembly. Valve assembly, Grumman P/N 55581, doors close of their own accord in flight, occurring at military and combat power. This causes cutting out or rough running of engine due to use of alternate air at high power. Springs holding doors in position are too small and weak. *Recommend* shorter and stiffer springs.

Landing Gear Up-Lock Micro-Switch. Failure of right landing gear to lock up was due to improper adjustment of micro-switch. Switch is fastened to wheel door uplock with two screws. Screw holes must be elongated to move switch. *Recommend* that contractor lengthen holes so that this adjustment can be made more readily.

Cowl Flap Actuator. Actuator failed to operate on automatic. Follow-up rheostat in automatic control circuit had an open and burned winding. *Recommend* that manufacturer determine if more rugged rheostat can be used in cowl flap actuator.

Generator Blast Cooling System. Modification of blast cooling system, as described in previous report, has reduced wear on LHH brushes in Model 1298-1A generator. *Recommend* that units having trouble with short brush life inspect generator blast cooling system and modify as recommended.

Blast Tube Fairing Assembly Collars. Collars installed at same time cyclic rate controls were adapted to guns were undamaged after 4000 rounds per gun. Following removal of cyclic rate controls, the collars failed after 3000 rounds. This is the third failure, showing that the collars will not withstand muzzle blast.

Gear Tooth Found in Sump. Gear tooth of undetermined origin was found when rear accessory section sump plug was removed in routine 60 hour check. No other metal particles were found in any sumps or strainers. All gears in rear accessory section were in good condition. Engine is being changed.

Skin Failure. Forward inboard corner of both port and starboard ammunition box wells cracked at station 102. Rivets worked loose and one rivet failed completely. Plane has made 15 catapult takeoffs and 15 arrested landings with full ammunition boxes.

Ejected Brass Damage. Stabilizer, GR. P/N 53808, has been damaged by ejected brass to such an extent that it is considered unsafe and is being replaced.

F2G-1 (75 Hours' Test)

Engine Failure. D2 articulating rod was broken 2" from piston pin. Initial cause of failure is undetermined.

Spark Plugs. Plugs C-34-S have been replaced by LS-86. C-34-S plugs have tendency to foul at low rpm's below 1000', but can be cleaned readily before take-off.

Hydraulic Actuating Strut. Strut failed 3 times in 43 hours. Seal failure is believed caused by defective actuating strut rod.

PV-2 (1197 Hours' Test)

Tachometer Syncroscope. Unit failed as contact brush springs became weak and brushes did not contact collector rings. Fatigue of springs is result of normal vibration after 986 hours. Syncroscope was replaced.

Piston Seal in Actuating Cylinder. Seal, P/N AN 6227-33, on one of the main landing gear actuating cylinders ruptured after 197 hours. Cylinder walls were undamaged. Failure was caused by improper soaking of seal or by nicking before installation.

Automatic Pilot. Jack and Heintz A & A automatic pilot performance is still unsatisfactory. Jerky operation and overcontrolling result in erratic oscillating control of aircraft. The following discrepancies have been corrected: *1* Rudder follow-up cable was started on center of drum instead of on edge as it should be to prevent overlapping. *2* Autopilot fluid filter had excessive accumulation of hydraulic system dirt. *3* Rudder tube conections between air relays were cracked. *4* Excessive end play in elevator balance oil valve. *5* Air relay valves sticking because of oil leakage from balance oil valves. *6* End play from .003" to .005" found in gimbal ring of bank and climb unit. Correction of these discrepancies improved operation, but jerkiness and oscillation continue.

PBY-6A (680 Hours' Test)

Bow Wheel Tire. Cord became visible after 329 landings and tire was replaced. The starboard tire was worn smooth after 350 landings and was replaced.

Rotating Brake Discs. Both port and starboard brake assemblies were replaced in 571 hours of operation. First set was replaced after 180 runway landings and the second after 143 runway landings. All discs show considerable wear but broken disc was on port side in both cases.

Stationary brake discs were installed in accordance with PTR 4116. Plated discs in starboard wheel averaged .120" thickness; unplated discs in port wheel averaged .116" thickness.

Magneto Blast Tube. Bracket assembly securing blast tube to nose section of starboard engine cracked after 634 hours.

Gyro Horizon Indicator. Indicator, Type F.S.S.C. No. 88-1-1350, failed twice. Outer gimbal ring pivot was grooved, and balls in outer gimbal ring bearing were rusted. *Recommend* more thorough inspection for proper instrument lubrication and overhaul.

TECHNICALLY SPEAKING

MAINTENANCE and operational personnel will find on this page in summarized form the Technical Orders and Technical Notes issued by the Bureau of Aeronautics during the month of October 1945. Reading the information listed here in no way relieves pilots and other aviation personnel from the responsibility of reading and studying these BUAER *TO's and TN's.*

TO 91-45 *(To be read by all pilots)*

This technical order reports the development of a new telescopic double-bladed paddle for use in the PK-1 Pararaft kit. Designed to furnish a simpler means of propulsion and to give improved Pararaft control, the paddle is made up of two 14" blades. Two-section shafts telescope into the blades

A long range visual reflector of new type is attached to one of the blades. It is expected that initial deliveries of new paddles will be made at an early date and will replace fabric hand paddles now in use.

TO 92-45 *(to be read by all* VSB *pilots)*

Results of recent tests with asymmetric loading of external stores on SB2C aircraft at NATC PATUXENT RIVER, as reported by this TO, brought to light the following facts relative to trim and control characteristics of this airplane under these load conditions.

With one 500 lb. bomb carried on the starboard wing the minimum speed for directional and lateral trim is 80 knots IAS. However, this loading increases risk during take-off and landing. With the same bomb load carried on the port wing minimum speed for lateral trim is 90 knots IAS and for directional trim 83 knots IAS. A 1000 lb. bomb on the starboard wing requires a minimum of 73 knots IAS for lateral control. This loading condition is hazardous and should be avoided. Asymmetrical external wing loading should not be used unless absolutely necessary. It is obvious too, that if a major portion of the fuel in the wing tanks is on the same side as an externally mounted tank or bomb, an unsatisfactory control condition results.

TO 93-45 *(To be read by all pilots)*

This is a complete TO dealing with fuel pressures for both engine driven and auxiliary fuel pumps. Because of the great variety of types and locations of these pumps in the fuel system a very close check should be kept on operating pressures to see that they remain within limits, high and low. TO 93-45 lists in table form the normal operating pressure limits. Future designs of aircraft will incorporate auxiliary fuel pumps capable of continuous delivery of specified pressures without overloading electric motors.
(Cancels and supersedes TO 23-45)

TO 94-45

Attention is directed to the development of a new binder for the Mk 4 life raft designed to overcome the difficulty heretofore encountered in removing raft from TBF/TBM type aircraft. The new binder makes it possible to compress a Mk 4 raft to a size easily removable from the fuselage in *Avengers'* compartment. It directs that the new binders shall be installed in all TBM/TBF aircraft when Mk 4 rafts are used.

T.O. & T.N. Quiz

ALL NAVAL *and Marine aviators should be able to turn in perfect scores on this quiz if they've completed their required reading in* BUAER *TO's and TN's for October.*

1. **What is the maximum altitude at which Navy planes may operate if not equipped with oxygen?**
2. **Does the new binder on the Mk 4 raft eliminate the raft case?**
3. **What method, used in flight, will help alleviate undesirable effects of asymmetric loading?**
4. **Why did the Navy find it necessary to develop a new type seat pan and back pan for parachutes?**
5. **Into what two classes, depending on their functions in the fuel system, may electric driven fuel pumps be divided?**

(Answers on page 48)

TO 95-45 *(To be read by all pilots)*

The order directs that oxygen shall be used by all personnel in aircraft in which oxygen is available on all flights 10,000 feet above sea level and on night flights, combat missions and training missions simulating combat when over 5000 feet above sea level. Aircraft not equipped with oxygen for all personnel aboard are not to make any flights in excess of 10,000 feet except under emergency conditions.
(Cancels and supersedes TO 54-44)

TN 91-45 *(To be read by all pilots)*

Describes the new and improved Model SP-1 Pilot Seat Pan and Model BP-1 Back Pan. Developed to improve pilot comfort and decrease pilot fatigue this new model has been live jumped and found to be satisfactory in every respect and to reduce fatigue materially.

These seat and back pans will be available at supply points at an early date, and are to be issued in order listed to pilots and aircrewmen in VF, VSB, VTB, VOS and VSO classes of aircraft as desirable.

TN 92-45 *(To be read by all pilots)*

This technical note establishes a standard nomenclature for all jet propulsion devices. The listing is made under the following headings:

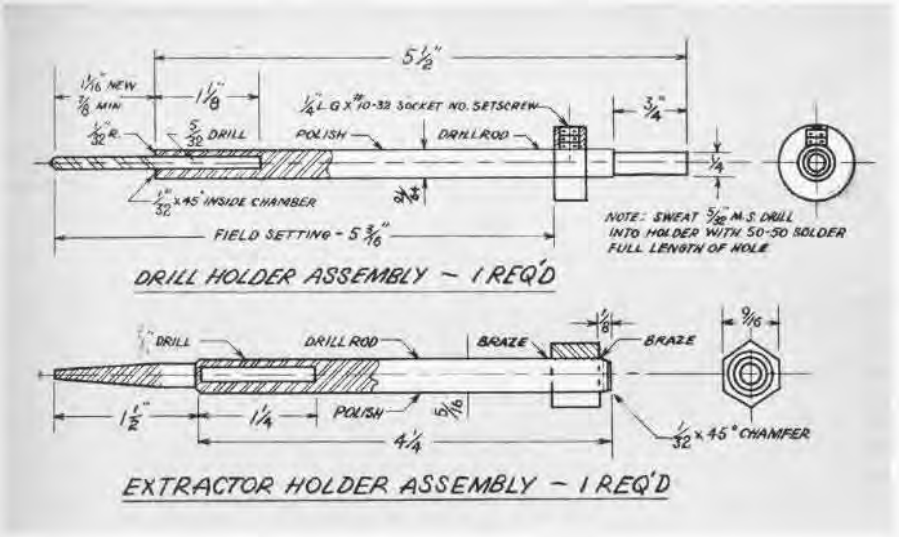
a. Propulsion of Aircraft (Including Pilotless Aircraft)
b. Assisted Take-off (JATO)
c. Rocket Projectiles

TN 93-45 *(To be read by all pilots)*

Information concerning replacement of certain Cutler-Hammer types of starter and primer toggle switches is contained in this technical note. Sticking of primer switch can cause rough engine operation, excessive fuel consumption, or engine damage due to overpriming. Sticking of the starter switch in the "momentary on" position can cause shorting and failure of starter due to continued operation after take-off.

TN 94-45 *(To be read by all pilots)*

This TN provides general information concerning the diluter demand oxygen regulator system, and presents recommended procedure for testing diluter demand regulator installation as to its acceptability for use in flight. Drawings showing standard Navy oxygen systems and an estimated oxygen consumption endurance chart are included in the TN.
Supersedes, cancels TO 19-44 and 72-44



Stud Removal on R-2800 Engines

DRILL AND EXTRACTOR ELIMINATE NEED FOR REMOVING REAR CASES

RUDM's and P&W field representatives have reported a number of intermediate rear case to rear case broken studs, P/N 31317. A new stud, P/N 93262, has been installed in R-2800-18W engines beginning with bureau number P-25317. This new stud, which is stronger and provides a shoulder in order to reduce vibration to a minimum, will be furnished to replace P/N 31317 when available for installation by overhaul activities and when needed by operating activities for R-2800 "B" and "C" series engines. A method for replacement of broken studs to eliminate the necessity for removal of rear cases or removing engines for overhaul has been devised and is furnished for information.

a. Adjust set collar on drill holder to a distance of 5 3/16" from tip to drill. This will prevent drill from entering magnesium case but will insure its penetration completely through the stud.

b. Insert drill holder assembly in a ¼" electric hand drill, and lubricate drill and drill holder with engine oil throughout the length that will be inserted into rear case. Do not use any washers on drill holder.

c. Start hole gently to avoid possible drill breakage from jagged edges on surface of break. Proceed to drill stud until set collar on drill holder comes up against boss on rear case. All intermediate rear case studs concerned with this operation are installed in blind holes, and there will be no danger of chips entering engine.

d. Insert extractor and tap it lightly to secure an initial bite in broken stud. Stud then may be back out by applying a 9/16" socket or box wrench to extractor nut and turning in a counterclockise direction.

e. After broken stud has been removed, hole should be flushed thoroughly with gasoline or carbon tetrachloride throughout its length to remove any remaining chips held by the lubricant applied by the drill assembly. This should be followed with a blast of compressed air applied to bottom of hole by means of a ⅛" copper tube extension on a standard air blast nozzle.

f. Lubricate a new standard size stud with graphited grease, insert, and check for tightness in driving. Stud should drive quite snugly, but if it appears to turn excessively hard, removal of some of the cadmium plating from the 5/16" 18 NC threads (coarse thread end) by means of a wire brush will allow stud to be driven with a minimum of trouble. A stud projection of 9/16" beyond rear case boss should be left.

g. Installation of nut with a plain washer under it then should be made and nut torqued at 150-175 inch-pounds.

Extractor Tool Repairs. An allowance of 3/16" has been made for drill sharpening and/or slight projection of broken studs above mating surface of intermediate rear case. Broken drills or drills sharpened below minimum drill projection limits (*see cut*) may be replaced by heating drill holder with a blow torch or acetylene torch, pulling out old drill and sweating in a new 5/32" high-speed steel drill that has been previously tinned with ordinary 50-50 solder. New drill then should be ground to the "new" projection dimension (*see cut*). The "new" dimension should not be exceeded, because longer projections will increase tendency of drill to wander when starting hole.

Broken or damaged extractors may be replaced in their holders in the same manner, except that these are prepared as shown in sketch and sweated in with silver solder. Care should be taken not to overheat fluted end of extractor during this operation, or its hardness may be impaired resulting in weakness.

NATechTraCom

Memphis Radioman's School Will Close

Instruction at the Aviation Radioman's School at the Naval Air Technical Training Center, Memphis, will be terminated on or about 1 May, 1946, upon graduation of the class which convened 5 November.

The following schools under cognizance of the Chief of the Naval Air Technical Training Command will be disestablished upon graduation of classes now undergoing training: Combat Aircrewmen Training School (ARM) at NATechTraCen, Memphis; JRM Line Maintenance School at the Glenn L. Martin Company, Middle River, Md.; Combat Aircrewmen Training Schools (AMM and AOM) at NATechTraCen, Norman; Aircraft Instruments Schools at the Sperry Gyroscope Company, Brooklyn, and El Segundo, Calif.; Air Navigational Radio Aids School at Gainesville, Ga.; Aviation Fire Control School at Jacksonville (instruction from this school, including turret instruction, will be included in the Advanced AOM School).

Men Train for Link Maintenance Duty

The latest Link Trainer available can be found in the new advanced maintenance course in Link Instrument Trainer, established at NATechTraCen, Jacksonville.

The new Link model provides advanced operational training, whereas older models were primarily for basic training. All controls found in heavy, single-engine aircraft are located in this newest Link-wing flaps, landing gear, oil gauges, carburetor and cowl flaps. It combines SNJ and fighter aircraft characteristics.

Specialists in Aviation Devices (SAD) from the new Jacksonville school are to maintain these complex Links on stations where they will be used to check out pilots on advanced operational training. Trainees entering must be graduates of the Special Devices School formerly located at the University of Chicago and must have the ability to perform and supervise 50-hour checks on Link Trainers.

NATechTraCom Opens New Basic School

A new Naval Training School, called Aviation Fundamentals, established at the Naval Air Technical Training Center, Jacksonville, on 1 December 1945 provides prospective aviation personnel with background necessary for thorough comprehension of Class "A" school instruction. The new school provides personnel with a basic knowledge of duties common to all rates in Naval Aviation.

The Aviation Fundamentals course has an initial capacity of 1200 trainees with an input of approximately 100 per week. Ultimate capacity is expected to be 2000.

Students enter the school directly from boot camp. Their twelve weeks' curriculum includes aeronautical organization, aviation seamanship, rate indoctrination, gunnery and watch standing, communications, basic skills and information, survival equipment, physical fitness and drill.

MACHINING MAGNESIUM

THIS is the third of a series of articles on magnesium, based on Dow Chemical Co. technical data. For previous articles see Naval Aviation News (Dec. 1945) and NavAer Maintenance Magazine (Oct. 1945).

Magnesium and its alloys have excellent machining characteristics. They can be worked at extremely high speeds: usually at the maximum obtainable on modern machine tools. Heavier depths of cut and higher rates of feed than are used on other metals are possible with magnesium. The life of cutting tools is very good, especially carbide tipped tools. Excellent surface finish is obtained because there is no tendency for metal to tear or drag. The free cutting action of magnesium produces well broken chips which do not obstruct the cutting tool or the machine. Extremely accurate parts with dimensional tolerances of only a few ten thousandths of an inch can be made by standard machining operations. The power required to remove a given amount of metal is much lower for magnesium than for any other commonly used metal.

Certain physical characteristics of magnesium must be taken into consideration in order to avoid minor difficulties in machining. High clamping pressures tend to cause greater springing in magnesium than in most other metals under similar conditions. For this reason, care should be taken when clamping and chucking magnesium. Extremely heavy depths of cut and feeds also are apt to cause the work to spring. Reamers and taps must be designed to eliminate the springing of the metal when it is cut during the machining process.

The power required to remove a given amount of magnesium by machining is much lower than that required to remove an equal amount of any other commonly used metal. The horse power per cubic inch per minute normally required for machining magnesium varies from 0.15 to 0.3.

Magnesium in all its forms is a free machining metal. Machining chips are usually well broken and do not obstruct the work of cutting tools. The type of chip produced is dependent upon the alloy used, the form and condition of the alloy, and the feed used. Rake angles, cutting speeds and cutting fluids which exert major influences on the chip formation when machining other metals have little or no influence on form of magnesium chips. Three general types of chips are produced in turning, boring, shaping and milling.

One of the oustanding machining characteristics of magnesium alloys is their ability to take an extremely fine finish. It is usually unnecessary to grind magnesium in order to obtain a smooth finished surface. Surface smoothness readings of three to five micro-inches have been reported for finish turned magnesium, produced at both high and low cutting speeds with or without a cutting fluid being employed.

Tool Design

Standard tools can be used on magnesium alloys; but when taking full advantage of the high cutting speeds and feeds possible with magnesium, tools should be somewhat modified. The low temperatures and pressures developed in cutting allow a wide latitude in choice of tool angles, but special attention should be paid to relief and clearance angles. Relief angles from 7° to 12° keep the tool flanks from rubbing on the work and minimize adherence of chips to tool. Clearance angles should be larger than those normally used for other metals to provide larger chip spaces. Best tool life and chip formation are obtained if the rake angles are held

GOOD MACHINABILITY IS MAGNESIUM ASSET

from 0° to 15°. They may be increased if it is desired to reduce tool forces, but some tool life will be sacrified. Smaller rake angles should be used with carbide tools than with high speed steel to prevent chipping.

The values for the end and side cutting edge angles are not critical and are best determined by conditions of the individual job. Extremely large side cutting edge angles should be avoided, however, to prevent chatter. Since magnesium alloys produce a large volume of chips, it is necessary that chip spaces be considerably larger than those used in tools for other metals. This is especially important in drills, taps, reamers and milling cutters.

Cutting Fluids

Efficient machining practice demands that high cutting speeds be used wherever possible. When high cutting speeds are used in machining magnesium, a fire hazard sometimes exists, particularly when fine chips are being produced. Although sharp tools greatly reduce this hazard and cutting feeds must be in the range of 0.001" and less to start fires, uncertainties in operations make it necessary to take precautions against this hazard. Iron or steel inserts and sand cast surfaces that are apt to spark when hit with a cutting tool also add to the fire hazard. A stream of cutting fluid, of four to five gallons per minute per tool, is sufficient practically to eliminate the fire hazard. If a particular job or machine tool prohibits the use of a cutting fluid, cutting speeds should be reduced to below 500 feet per minute, and the recommendations regarding sharp tools and feeds rigorously followed. In all machining operations where a low cutting speed is used, magnesium may be machined safely without a cutting fluid, but safe practice dictates that where high cutting speeds are used cutting fluids should be used also.

A wide variety of mineral oil cutting fluids will function satisfactorily on magnesium. Almost any oil will materially reduce the fire hazard if applied in sufficient quantities, but to secure adequate cooling, the cutting oil must have a low viscosity. Since low viscosity mineral oils usually have low flash points, a fire hazard due to the oil is encountered. This fact necessitates a compromise between cooling power and flash point. Additives that decrease surface tension and increase wetting power of the cutting fluids are beneficial. The chemical nature of magnesium makes it necessary that the free acid content of cutting fluids be below 0.2% and that the use of vegetable or animal oils, which may oxidize and increase acid content, be restricted.

Water soluble oils, oil water emulsions, or water solutions of any kind, although good coolants, should not be used on magnesium. Water will greatly intensify any chip fires which might be started accidentally and also will make reclamation of machine scrap very inefficient. The presence of moisture on turnings causes the generation of small amounts of hydrogen that present a definite hazard during shipment or storage. Experience has shown that use of water base cutting fluids on magnesium is dangerous.

Fire Hazard

Magnesium alloys must be heated to their melting points before they will ignite. Roughing cuts and medium finishing cuts produce chips of such a size that they are not readily ignited during machining. Fine cuts, however, produce chips which sometimes will ignite if produced at high cutting speeds. Stopping the feed and letting the tool dwell before disengagement, and letting the tool or tool holder rub on the work will produce extremely fine chips; consequently, these practices should be avoided. Factors tending to increase the fire hazard are high cutting speeds, extremely fine feeds, dull or chipped tools, improperly designed tools and poor machining techniques. With sharp cutting tools, it is necessary to use a feed of less than 0.001" and cutting speeds in excess of 1000 feet per minute to create a serious fire hazard. Even under the most adverse conditions, that is with dull tools and fine feeds, the fire hazard is very slight at speeds below approximately 700 feet per

minute. Sand cast surfaces, oxide inclusions, and ferrous inserts which will cause sparks when hit by the cutting tool, increase the possibility of fire.

If a magnesium fire starts, it may be extinguished readily by carrying out the following directions:

1 An adequate supply of recommended fire extinguisher should be placed near each machine where it can be readily obtained by the operator. Recommended extinguishers are G-1 powder; clean, dry, unrusted cast iron chips and graphite powder. Sand, talc, and pitch can be used on small fires but not satisfactory for large fires.

2 Extinguisher should be sprinkled over the burning magnesium to provide a layer of material approximately ½" deep. Additional material should be added to spots that smoke excessively. These instructions can be applied generally to all powdered materials but instructions as given by the manufacturer should be followed.

3 Active fires on combustible surfaces should be covered with extinguisher and the mass shoveled into an iron container.

4 Water or any of the standard liquid or foam type extinguishers must not be used directly inasmuch as they will intensify the fire. If a magnesium fire reaches such proportions that it cannot be controlled by recommended means, water might have to be used to protect surrounding structures. Even under such conditions, water should be used with extreme caution. Sand, talc, asbestos and aplite will accelerate large magnesium fires.

Magnesium chips and dust should not be allowed to accumulate on machines or clothing of operators. Dust and chips should be removed frequently and stored in clean, plainly labeled, covered metal cans. Machines and floor should be kept clean. No smoking should be allowed around machining work where magnesium is used.

RUDM Digest

Now a separate publication, RUDM Digest continues its aid to maintennace activities and invites comments or suggestions for improvement. Address Chief BuAer, Field Service Reports Section, Navy Dept., Washington 25, D. C.

RUDM's "On Ice" are isolated cases listed for the first time. Read these to see if the same trouble has occurred elsewhere. If so, a report should be submitted. This is true also of "On Ice Supplement," items previously listed and since classified as isolated. RUDM's "Progressing" are under investigation. Watch future issues for answers under RUDM's "Completed."

Address requests for copies to Publications Branch, BuAer.

LARGE ENGINE ON LEFT DESIGNED FOR COMBAT PLANE, SMALL ONE FOR U.S. BUZZ BOMB

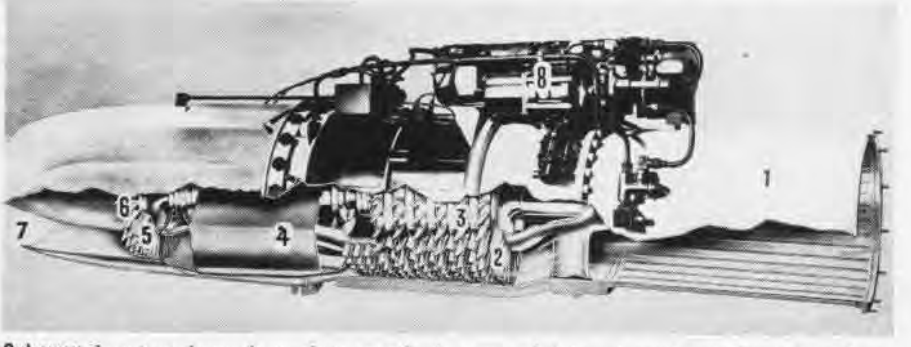
LIGHT WEIGHT NAVY JET ENGINES

The Navy has revealed details on two light-weight jet engines developed for it during the war—the *Yankee* which is 19" in diameter and the baby jet which is only 9½" in diameter and is used for radio-controlled target aircraft.

Air entering the throat of the *Yankee* at 300 mph is boosted to 600 mph by a series of rotor blades (Figs. 2 and 3, below) that force it into the compressor. Blades spin 300 times a second, scooping incoming air into the chamber at the rate of a million cubic feet an hour. In the chamber it is mixed with injected gasoline and ignited. The *Yankee* weighs less than half a pound per pound of thrust, or less than half the weight of piston type engines.

Heat of combustion expands gas to three times its previous volume and triples its speed of exit through the jet nozzle. As it goes out it spins gas turbine blades which furnish power to run the compressor blades. The rest of the energy—1400 pounds of thrust—is used to propel the aircraft. This thrust is equivalent to 1400 hp at a flight speed of 375 mph.

The baby jet yields a propulsive thrust of 275 pounds, sufficient to drive the target aircraft (NANews, November 1945) at 200 mph. It burns kerosene. Because of their small frontal area, the two jet engines present low air resistance and fit well into the clean streamlining incorporated in modern aircraft design so important today.



Cut-away drawing shows how slow speed air rammed into jet engine is heated and expanded to yield high speed gasses. Fig. *1* is inlet duct and engine oil cooler; *2* axial flow compressor to speed up air; *3* compressor blades; *4* combustion chamber; *5* stationary blades; *6* gas turbine wheel; *7* orifice where gas exits; *8* compressor engine auxiliaries.

SIMPLE ASSEMBLY AND CONSTRUCTION AID TRAINING OF JET MAINTENANCE PERSONNEL ON TURBO-JET ENGINE PROCESSES

SIMPLICITY KEYNOTES JET MAINTENANCE

FAR FROM being the bugaboo of complicated science that so many dime novels have led their readers to believe, the gas turbine or turbo-jet engine gives promise to a new era for maintenance men—easing their problems and freeing them from worry over involved trouble-shooting.

The primary interests of the mechanic in turbo-jet engines revolve around the general effect it is all going to have on his personal maintenance life. How soon will jet planes reach the Fleet? Are the maintenance problems far different from those of the ordinary reciprocating engine with which he is now familiar? Will he have to unlearn all he learned and then train in a new, high-sounding technical language? Is there a training program that will help him to learn anything new that will be required of him? Will special tools replace those with which he has become familiar? Is overhaul a big problem? These and many other questions enter the mind of the AMM, as scuttlebutt is passed along on new turbo-jet.

Without propeller, and having only one major moving part, jet power plant units promise a certain ease of maintenance heretofore unattainable with conventional aircraft engines. There are no complicated oil cooler controls, superchargers, intercoolers, carburetor attachments or drastic accessory setups. That means, of course, no complicated controls and rigging to operate these various familiar accessories. Having only five power plant instruments the entire engine is quite compact.

The mechanic will have quite a bit to learn, however. And too, there will be modifications as ideas, suggestions and new facts come to light through the work of pilots and maintenance personnel in the field.

Actually there will not be much new nomenclature the AMM doesn't know already. Terms such as "truss ring," "turbine shaft" or "turbine wheel" will become familiar in a very short time. Unlike a conventional engine, the jet engine will require its keeper to maintain a close watch on such things as bearing temperatures, tail pipe temperatures and other units affected by the terrific heat that develops. Most of the problems affecting maintenance personnel will result from high temperature and from air duct turbulence set up by the extremely high RPM.

Mainly, a turbo-jet engine consists of a compressor, combustion chamber, a turbine connected to the compressor and exhaust nozzle. Actually the turbine is connected directly to the compressor and provides the power for compressing the air. The turbine and compressor along with the interconnecting shaft make up the rotor which, except for accessory drive gears and shafts, is the only moving engine part.

The rotor is supported by two, three or four main bearings depending on size and type of engine. To date, ball and roller bearings have been used to a great degree. Maintenance men will

Maintenance is simple and offers no complicated task for AMM who will find all parts accessible and adjustments within ready reach

No Propeller in the way for these mechanics. Oil cooler installations become a thing of the past and involved maintenance is history

have to keep close watch on bearing temperatures. Terrific heat, plus high RPM, tend to create overheating.

Turbo-jet maintenance can be treated under the following breakdown:

Fuel or Fuel Control

The fuel control systems of jet type engines differ in principle and operation from the fuel metering system the AMM now knows. The fuel system consists mainly of a filter, an engine-driven pump and an engine-driven overspeed governor. There is nothing that is fundamentally different from any other fuel metering system the average technician already understands.

Various type fuels can be used in turbo-jet engines. Kerosene has proved satisfactory. So have most aviation fuels. Some of these have a better lubricating value than others and give a better performance.

Though the lube system of the jet engine provides lubrication for rotor bearings and gears and bearings in the accessory drives, the AMM will be glad to know that there is no necessity for oil cooler manipulation as he now knows it. Jet engines use a much lower viscosity oil than is common to the conventional engine. Use has even been made of some aircraft hydraulic oils, which have shown satisfactory results.

On turbo-jet engines the ignition system is used only for the starting of a flame in the combustion chambers. The ignition system actually is shut off immediately after starting. Maintenance of various systems will mean replacing of ignition plugs (usually two or more), replacing of fuel nozzles, combustion liners, ignition coils, checking oil levels and checking turbine clearances. Overhaul times on most of these engines have been running about 50 hours. It is an interesting speculation to assume that actually there might be no maintenance at all as far as the mechanic in the field is concerned. Because the front end of a jet type engine is the accessory end and because the entire unit weighs only 885 pounds, it is proving more feasible to change entire units rather than attempting to service individual accessories and parts.

In general the turbo-jet engine will not require as much maintenance as the conventional aircraft engine. Because of its comparatively new state of development it will require close checking and frequent overhaul. Engine failures have been few, and those that have occurred can be attributed largely to turbine blade failures.

New Jet Rate

A new Navy rate has been created for the men who service jet planes—AMM-T. When the rate was established, a school was set up in Chicago for AMM-T's. Subsequently the school was moved to Memphis. Four weeks is considered adequate to train a man in the intricacies of turbo-jet, provided he has had a fair background in aviation engines. As long as open-end and box-end wrenches remain there is no reason for an AMM to think he'll need a lot of new tools for jet engine work.

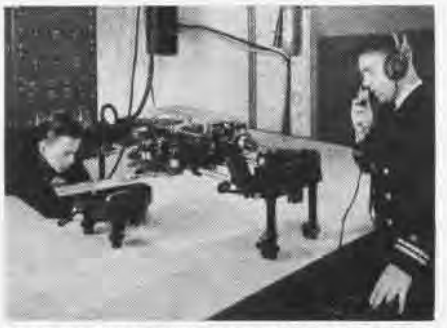
Some of the more enthusiastic proponents of the turbo-jet engine see in it a complete replacement for the conventional reciprocating engine. More conservative estimates indicate that there is a range in which the turbo-jet will definitely exceed present engines, but that it will not reach that stage in the near future. The jet engine must mature in service and be tested in evaluating squadrons formed solely of turbo-jet powered planes before definite predictions can be made concerning its possibilities in Naval Aviation.

New Rudder Control Unit Cover

A transparent cover plate is replacing the metal cover on Mk-3 rudder control units of PBM-5 aircraft, a change found to have many advantages in operation, instruction, and maintenance. BuAer, Maintenance Division, intends to replace all the old model rudder control units in service with the latest model, or to modify all the old units to include the latest improvements, whichever is more practicable.

Radar Trainer Aids VF(N) Pilot

To train pilots in skillful use of the AN/APS-6, which permits pilots to locate, track down and fire at enemy aircraft in darkness and fog, Special Devices division, Office of Research and Inventions, developed the night fighter trainer. The device, called AN/APS-6-T5, gives realistic practice in making night interceptions.



CRAB MARKS POSITION OF PILOT AND ENEMY

The pilot operates the F6F-5N Operational Flight Trainer, a mockup of the *Hellcat* night fighter with complete instruments including radar scope. Flight information from the trainer is fed through electro-mechanical systems to the trainer equipment and recorder.

The pilot maintains contact with the GCI and tower radio and gets instructions from the trainer control operator, who vectors the fighter to the target plane. After the pilot makes "contact" with the target the instructor maneuvers it in evasive tactics. Instruments record hits and solve the equations for slant range, azimuth angle and elevation angle relative to the target.

The accompanying photograph shows the problem table with the bridge-type crab which is the target, and the fighter crab, instructor's controls for the target and GCI information dials in the rear.

Succeeds List dated 1 November 1945

LATEST BULLETINS ENGINE, AUXILIARY POWER PLANT, ACCESSORY, PROPELLER Dated 1 December 1945

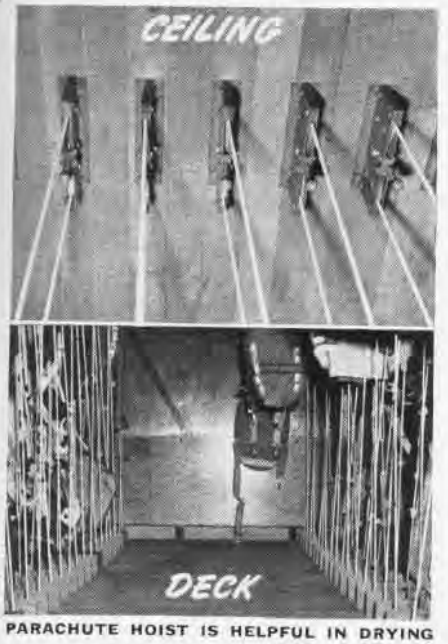
ENGINE	BULLETIN	DATE	SUBJECT	EXPLANATION
PRATT & WHITNEY				
R-1830	390	10-24-45	*Spring, Fuel Feed Valve—Replacement of*	Provides standard marking of modified assemblies
	429	11-1-45	*Diaphragms, Fuel, Ceco 1900-CPB-3 Model Carburetor—Material Change*	Advises activities of new part numbers assigned due to material change
	440	10-31-45	*Clip and Bracket—Sump Breather Pipe*	Informs all activities of method to minimize breakage due to vibration
	441	11-15-45	*Pistons, Split Boss*	Informs activities of new type piston
	443	10-10-45	*Diaphragms, Air, Used in Ceco 1900-CPB-3 Model Carburetor—Pre-Stretching of*	To pre-stretch subject diaphragms prior to flow bench calibration, and prevent lean operation caused by stretching of subject diaphragms when subjected to pressure differentials caused by engine back-firing
R-2800	113 Supp. 2	11-1-45	*Ignition Shielding Rework*	Provides instructions for modification of tubular type ignition harness to improve ignition interference suppression
	162 Rev. 2	11-1-45	*Valve Tappets, Guides, Rollers and Pins*	Includes information on taper reaming the other ends of guides at assembly
	177 Supp. 1	11-15-45	*Intercylinder Oil Drain Hose—Shields and Clamps*	Incorporates improved rocker drain hose shields and clamp
	198	11-16-45	*Springs—Fuel Feed Valve*	Provide for a nominal fuel pressure of 10 lbs. at discharge nozzle, improving performance at high altitude
	200	10-24-45	*Oil Seal Ring, Auxiliary Impeller Shaft—Incorporation of*	Reduces possibility of oil leakage into auxiliary blower section
	244	10-29-45	*Impeller Thrust Plates—Lubrication of*	Further improves lubrication of impeller shaft thrust plates
	260	11-4-45	*Impeller Shaft Holder*	Inform overhaul activities of clearance cutouts on one edge of the impeller shaft holder
	262	10-24-45	*Blind Stud Holes, Center Crankcase—Rework of*	Avoids possibility of liquid or air lock in center crankcase blind stud holes
	263	11-19-45	*Impeller Shaft Front Oil Seal Ring Carrier*	Provide more clearance between impeller shaft front oil seal ring carrier and mating face of impeller thrust liner reducing possibility of scoring liner
R-4360	2	8-29-45	*Basic Engine Differences*	Disseminates information regarding basic differences between engine models listed
	5	11-1-45	*Intake Pipe Drain Valves*	Informs activities on inspection and cleaning period for intake pipe drain valves
	6	10-30-45	*Oil Screen By-Pass Valve*	Eliminate opening of oil screen by-pass valve under normal operating conditions
	8	11-15-45	*Master Rod Bolt Stretch*	Gives instructions for measuring master rod bolt stretch
	11	11-15-45	*Accessory Drive Housing*	
WRIGHT				
R-1820	355 Rev. 2	11-7-45	*Replacement Accessory Drive and Starter Shaft Oil Retaining Plug*	Prevents breakage of accessory drive and starter shaft oil Retaining plug at web section
	388	10-17-45	*Intake Pipe Connections—Improvement of*	Provide an improved fitting for spanner wrench on intake pipe packing nuts and provides a steel washer between packing nut and neoprene packing
	393 Supp. 1	10-24-45	*Plate, Manual Mixture Control Valve, Stromberg Part No. 397336, Used on PD-12 K10 Model Carburetor—Reworking of*	Corrects error in original bulletin
R-2600	113 Rev. 2	9-15-45	*Push Rod Housing Hose Clamps, WAC Part No. 4019D and 5047D—Replacement of*	Gives information on use of improved wire type hose clamp which has added clamping action to further minimize leakage
	122 Rev. 2	11-7-45	*Replacement Accessory Drive and Starter Shaft Oil Retaining Plug*	Prevents breakage of accessory drive and starter shaft oil retaining plug at web section
	151 Rev. 1	11-8-45	*Clutch, Supercharger—Rework to Improve Operations*	Improves clutch operation
GENERAL ENGINE BULLETINS				
	76 Supp. 1	10-19-45	*Impellers—Methods for Balancing and Reworking*	Provides additional information
	85	11-16-45	*Stromberg Injection Carburetor—Checking Air Section for Leakage of*	Eliminates difficulties encountered on an engine if air section of carburetor leaks
POWER PLANT ACCESSORY BULLETINS				
	59-45	11-1-45	*Miscellaneous Accessories, J-22*	Prevents malfunction of hydromatic propeller feathering systems, fuse will be removed from motor circuit

Parachute Hoist Promotes Order

NAS ALAMEDA—The designers of a new parachute hoist here were after two prime objectives in the development: *1.* Maintenance of order among drying chutes and *2.* reduction of effort required to hoist parachutes for drying.

WAVE personnel engaged in the daily job of hoisting chutes to the ceiling for drying found the 35-pound pull could be quite fatiguing after the fourth or fifth chute. In addition, the drying shed usually presented a maze of fouled and twisted lines that required additional personnel to untangle. The new hoist eliminates all of this. The idea was developed under the Navy Employees' Suggestion program.

The device consists of two units, one on the ceiling, the other on the



PARACHUTE HOIST IS HELPFUL IN DRYING

floor. A ten-pound weight attached to the down-pull cord assists the worker in hoisting the chute. After the hoisting line is attached to the chute, it is raised with a very light pull and then locked in place by release of the spring-loaded lever attached to the hook.

[DESIGNED BY WALTER SCHULZ & RAYMOND WHITE]

VR-4 Creates MARU for R5D's

NAS OAKLAND — VR-4, the heavy maintenance squadron for NATS's fleet

MARU IS COMPLETE SELF CONTAINED UNIT

Succeeds List of 1 November 1945 — *1 December 1945*

LIST OF NUMBER AND DATE OF LATEST ISSUE OF AIRCRAFT SERVICE CHANGES AND BULLETINS

Airplane	Bulletin	Date	Change	Date
F6F	129	10-18-45	94	9-29-45
FM	56	10-12-45	62	9-7-45
F4U-F3A-FG	250	10-18-45	235	11-14-45
F7F	28	11-6-45	25	11-1-45
F8F	3	10-23-45	0	0
FR	11	11-7-45	2	9-25-45
GH-NH	12	9-16-45	22	6-15-45
JM	41	10-3-45	46	8-1-45
JRB-SNB	43	10-1-45	27	3-20-45
PV	172	11-7-45	182	11-14-45
PBJ	67	9-28-45	79	9-19-45
PBM	149	11-7-45	176	10-23-45
PBY	137	11-15-45	187	10-19-45
PB2Y	74	10-19-45	156	8-9-45
PB4Y	206	11-14-45	172	11-2-45
PB2B	10	10-24-45	5	10-19-45
R5C	67	11-1-45	154	10-8-45
R4D	52	10-31-45	48	10-3-45
R5D	83	11-1-45	138	10-15-45
RY	84	11-14-45	31	8-14-45
R5O	17	9-19-45	0	0
SB2C-SBF-SBW	228	11-14-45	153	9-19-45
SC	92	10-18-45	42	9-5-45
SNJ	38	9-19-45	0	0
TBF-TBM	216	10-8-45	243	9-10-45
TBY	19	10-15-45	6	10-26-45

For complete list of Aircraft Service Changes and Bulletins, see Naval Aeronautics Publications Index NAVAER 00-500 and supplement 00-500A.

of R5D transport planes, recently designed and constructed a Mobile Aircraft Repair Unit especially adapted for use with the R5D. The unit, which is self-propelled, contains batteries and cables for starting engines; an air compressor with hose and gauge for pumping up tires; nitrogen bottles with hose and gauge for pumping up struts; a compressed air unit for spraying solvent required in checking for oil leaks; a 110-volt generator with lights and attached cables; hand drills, both electric and air operated; drawers with tools most frequently needed.

The top of the cart forms a work platform on which two ladders may be set up for access to engine nacelles.

The MARU was designed particularly for use at advanced bases and for correction on the ramp to avoid delay of scheduled flights. It is a complete self-contained unit that provides facilities for NATS turn-around checks.

BuAer Redesigns Mooring Buoy

The seaplane mooring buoy has been redesigned by BUAER to improve the method of securing seaplane to buoy and to permit quick location of buoys at night from a greater distance.

The pick up loop may be fastened to seaplane snubbing post quickly and simply. Threading of the mooring line through the buoy spider and securing it to the snubbing post is not required. The mooring operation may be completed by the bow man with one hand without a change of position. This feature speeds up securing of seaplanes and will help prevent missed buoys.

Since the reflectors are visible from a distance of 2000 feet, quick and easy location during night operations is possible. Present buoy visibility of 100 feet is not sufficient to permit squaring away for a good approach.

The new buoy now is undergoing tests at the Naval Air Center, Patuxent River, and should be available soon.

NEW SEAPLANE BUOY SIMPLIFIES MOORING

INDEX TO NANEWS JAN. 1 TO DEC. 31 INCLUSIVE 1945

INDEX 1945

INDEX TO NANEWS JAN. 1 TO DEC. 31 INCLUSIVE 1945

INDEX JAN. 1 TO DEC. 31 INCLUSIVE 1945

PUBLICATIONS

The following Flight Safety Bulletins, Aviation Circular Letters, Technical Notes and Technical Orders have been issued since 1 November 1945. Copies are available on request to Publications Division, Bureau of Aeronautics.

FLIGHT SAFETY BULLETINS

17-45 *Flight Planning.*
18-45 *Activation of Air Sea Rescue.*

AVIATION CIRCULAR LETTERS

78-45 *Reports of Unsatisfactory or Defective Material (RUDM).*
119-45 *Aircraft Accident Report, Form NavAer 339.*
125-45 *Establishment of Re-inspection Periods and Clarification of the Disposition and Handling of Class 88 Aircraft Instruments Having a Re-inspection Date.*
126-45 *Aerial Photographs contained in Hydrographic Office Route Manuals and Nav-Air Pilots—Declassification of.*
127-45 *Aeronautical Material Specifications—Procedure for Requesting.*
128-45 *Naval Aviation News.*
129-45 *Revision of Aeronautics Technical Publications Requirements; Request for.*
130-45 *Aviation Physical and Military Training Program.*
131-45 *Reclassification of Naval Combat Aircraft.*
132-45 *Aviation Gasoline, Use of.*
133-45 *Supervision of Extended Flights.*
134-45 *Use of Naval Aircraft—Cross-Country Training.*
135-45 *Handbooks, Manuals, and Catalogs; Revised Classification of.*
136-45 *Aircraft Weather Reports.*
137-45 *Minor Repairs to Operating Aircraft—Limitation of Repairs to be Accomplished—Procedures for Handling When Repairs are to be Accomplished by Assembly and Repair Departments.*
138-45 *Decommissioning of Continentally Based Fleet and Marine Aviation Activities—Policy and Procedures to be Followed Regarding Disposition of Aeronautical Equipment, Material and Equipage.*
139-45 *Procedure for Redistribution and Disposal of Excess Material and Equipment Resulting from the Disestablishment of Continental Naval Air Activities.*
140-45 *Peacetime Policy for Modernization of Aircraft and Aeronautic Equipment.*

TECHNICAL NOTES

94-45 *Diluter Demand Oxygen Regulator System—General Information.*
95-45 *Model F4U Type Airplane Spin Recover Characteristics.*
96-45 *Parachute for the Radar Operator in the F7F Airplane.*
97-45 *VHF Antennas—A N-104A X—Corrosion of.*
98-45 *G-1 Automatic Pilot Bank and Climb Unit—Use as Flight Instrument.*
99-45 *Covers for Pitot Static Tubes.*

TECHNICAL ORDERS

95-45 *Use of Oxygen for High Altitude Flying.*
96-45 *Preservation of Aircraft—Instructions for Sixty-Day.*
97-45 *Diluter Demand Oxygen System—Flight Information.*

LETTERS

SIRS:

In full dress ceremonies on the flight deck, the U.S.S. *Guadalcanal* received the Presidential Unit Citation on 10 November 1945 at NATB PENSACOLA, where it is now engaged in carrier qualification training.

Although officers and men have been permitted to wear the citation ribbon, the contents of the citation have, until recently, been classified CONFIDENTIAL.

The citation, tendered by Rear Admiral C. A. Pownall USN, Chief of Naval Air Training, to Captain Shirley Miller USN, present CO of the *Guadalcanal*, was presented by the President of the United States to Anti-Submarine Task Group 22.3 consisting of the U.S.S. *Guadalcanal* (flagship), U.S.S. *Pillsbury*, U.S.S. *Pope*, U.S.S. *Flaherty*, U.S.S. *Chatelain*, U.S.S. *Jenks* and Composite Squadron Eight.

Text of the citation:

For extraordinary heroism in action against an enemy German submarine during the capture of

that vessel off French West Africa, June 4, 1944. Locating the German U-505 after a long period of fruitless search during an anti-submarine sweep, the Units of Task Group 22.3 skillfully coordinated in the relentless tracking of the objective and in the hold-down operations which culminated in an effective depth-charge attack and the forcing of the U-boat to the surface where the hostile crew was subjected to the combined automatic weapons' fire of our destroyer escorts and aircraft with relatively minor material damage inflicted on the target. Aware that the ship might momentarily sink or blow up, a small party braved the danger of hostile gunfire to board the vessel while she was still circling at 5 or 6 knots on the surface, plunged through the conning tower hatch and worked desperately to keep her afloat and to aid other more fully equipped salvage parties in making the U-505 seaworthy for the long tow across the Atlantic. In accomplishing the first successful boarding and capture of an enemy man o' war on the high seas by the United States Navy since 1815, Task Group 22.3 rendered invaluable service affecting subsequent operations in the Battle of the Atlantic and upheld the oldest and highest traditions of the United States Naval Service.

The citation was signed for the President by the Secretary of the Navy.

Admiral Pownall said: ". . . All personnel who are attached to the unit . . . and are entitled to wear the Presidential Unit Citation should wear it with unbounding pride in the fact that they were members of the great team."

Captain Daniel Gallery USN was skipper of the *Guadalcanal* when the German sub was captured. [*See p. 14, 15 June 1945 issue of* NANEWS.]

NATB PENSACOLA — LIEUT. (JG) USNR

SIRS:

The men of the *Belleau Wood* are publishing an illustrated history of the ship entitled *Flight Quarters*.

It is intended to mail a free copy to every man who has served at least three months aboard, for whom a mailing address is available.

Former *Belleau Wood* men should send their names and addresses to "Editor, *Flight Quarters*, U.S.S. *Belleau Wood* (CVL24), c/o FPO, San Francisco, Calif."

J. W. ALEXANDER, LT. USNR
Editor

SIRS:

Air Group 33 recently completed three months of intermittent operations aboard this vessel and is now being relieved.

During this period cover was provided for the Third Fleet logistics group until the end of hostilities. Searches and some training flights have been flown since. A total of 560 landings were made with an accident total of one flat tire.

The record is considered noteworthy because of the small number of landings over the long period. At no time was it possible for either the pilots or landing signal officers to get any "bounce" drill and the pilots often did not fly for as much as three weeks.

U.S.S. *Chenango*

CAPTAIN HARRY D. FELT, USN
Commanding Officer

SIRS:

We thought these pictures of seaplane operations by seaplane tenders in Tokyo Bay might be interesting to someone.

They show a peaceful atmosphere in enemy waters. The greatest enemy now to these peaceful operations is the weather and at times it is treacherous.

C. C. LUCAS, USN
U.S.S. *Gardiners Bay* (AVP-39)

The Cover. Officers and men of the Navy's newest carrier, the U.S.S. *Franklin D. Roosevelt*, stood at attention on the flight deck during commissioning ceremonies for their ship at Brooklyn Navy Yard. Pres. Truman spoke.

CONTENTS

ANSWERS TO QUIZZES

● GRAMPAW QUIZ (p. 10)

1. He should call safety pilot and if contact is not established, he immediately should go contact. Ref. *Flight Safety Bulletin* 15-45.
2. True. Ref. 7(a), Page 16 of TN 84-45.
3. True. Ref. *BuAer Manual*, Art. 6-204. Specific exception contained in the CAR.
4. To allow engine heat to escape as rapidly as possible, thus avoiding heat damage particularly to the electrical insulation. Ref. F.S.B. 6-45.
5. The C.O. of each activity. Ref. TO 82-45.

● T.O. & T.N. QUIZ (p. 36)

1. 10,000 ft. 2. No 3. Opposed Fuel Loading 4. Relieve Pilot Fatigue 5. Transfer pumps and auxiliary fuel pumps

● NAVIGATION QUIZ (p. 18)

1.c 2.c 3.a 4.b

● RECOGNITION QUIZ (back cover)

1. A-26 2. SC-1 3. OS2U 4. IL-4 5. Halifax VIII 6. Spitfire 22

NAVAL AVIATION NEWS

Published monthly by Chief of Naval Operations and Bureau of Aeronautics to disseminate safety, survival maintenance and technical data to the aeronautical organization. CONTRIBUTIONS INVITED. Air mail should be used where practicable to insure speediest delivery of material submitted for publication, addressed as follows: Chief of Naval Operations, Naval Aviation News, Navy Department, Washington 25, D. C.

NAVY DEPARTMENT
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON 25, D. C. 8 November 1945

AVIATION CIRCULAR LETTER NO. 128-45

To: All Ships, Stations and Units Concerned with Aviation

Subj: Naval Aviation News

Ref: (a) Circular Letter No. 5-35, File Aer-F-5-ETC, A7-1(3), dated 17 April 1935
(b) U. S. Navy Regulations, Art. 76 (4) (c)

Heres how it works ...

CARRIERS

Monthly Report

TRAINING COMMANDS

Monthly Report

MARINE CORPS

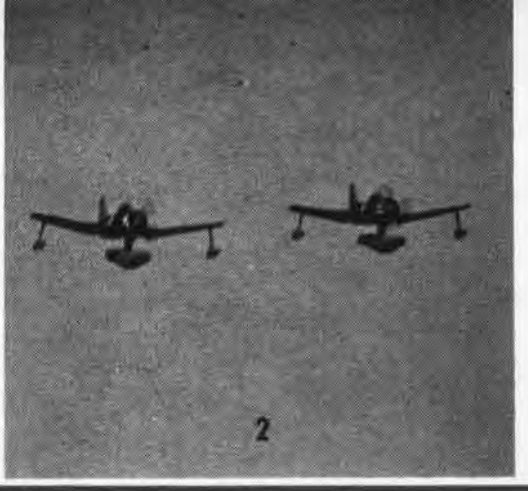
Monthly Report

It should be apparent and appreciated that the benefits from Naval Aviation News will be in direct proportion to the amount of interest shown by the operating units as reflected in their Monthly News Reports.

J. H. CASSADY
Acting Deputy Chief of Naval Operations (Air)

SQUADRONS

Monthly Report



RECOGNITION

QUIZ

American, British and Russian Aircraft

F4F (グラマン) 戦
速力 531.K

THAT Japanese AA gunners realized the importance of airplane recognition is evident from the silhouettes of Navy planes that lined the bulkheads between gun mounts on the battered battleship *Nagato*. The Jap recognition drawings were noted by U.S. Naval experts when they came aboard the damaged dreadnaught anchored at Yokosuka Naval Base. Navy planes of some of the types silhouetted on the *Nagato's* bulkhead blasted that battleship in various Pacific encounters and put her out of action. Inaccuracies in these crude plane drawings copied from Jap manuals, are easy to spot.